Final report

OWMC
Ontario
Waste Management
Corporation

A provincial crown corporation

S.S. WILSON AND ASSOCIATES
DIV. OF M.H.G. ENGINEERING INC.

SITE ASSESSMENT
PHASE 4B:
NOISE

Prepared for
The Ontario Waste Management Corporation

Submitted By

S.S. Wilson, P.Eng.

Report W85-248 No. 3

October, 1987

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November 11, 1987

Attention: Mr. P.D. Hunt
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Dear Sirs:

We are pleased to submit the final draft of our Report W85-248 No. 3, Site Assessment, Phase 4B : Noise, dated October 1987.

If you have any questions please do not hesitate to call. Thank You.

Yours Truly,

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SITE ASSESSMENT
ONTARIO WASTE MANAGEMENT CORPORATION
PHASE 4B: NOISE

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-W85-248-J:	Landfill Operations Noise Level Contours Southeast Quadrant
-W85-248-K:	Landfill Operations Noise Level Contours Southwest Quadrant
-W85-248-G:	Construction Period Leq Noise Level Contours Highest Activity Month.

EXECUTIVE SUMMARY

Purpose of the Report

The purpose of this report is to document the noise impact studies carried out for the Ontario Waste Management Corporation as part of the Phase 4B development process for the waste treatment and disposal facility.

Specifically the objectives of the studies are to:

- define the existing environmental noise conditions around the preferred site.
- predict and assess potential noise impacts associated with the construction and operation of the facility.
- identify appropriate mitigation measures to minimize possible noise impacts.
- identify monitoring programs to assess noise impact during ongoing operations.
- prepare documentation to meet the requirements of the Ontario Environmental Assessment Act.

Scope of the Noise Impact Studies

In assessing potential noise impact in the vicinity of the facility, the Phase 4B studies have included a comprehensive analysis for noise generation and impact during the construction period and during on-going process plant and landfill operations at the preferred site. The studies also assessed noise impact along the access routes, due to OWMC-generated traffic, for the construction period and ongoing operations. The report documents the predicted noise environment with and without the OWMC facility for year 5 (150,000 tonnes per annum) and year 10 (300,000 tonnes per annum) levels of operation. Possible mitigation measures and a recommended ongoing noise monitoring program are also included.

The noise studies are based on detailed technical data provided by Monenco Limited and M.M. Dillon Limited and on existing noise level measurements carried out on site by S.S. Wilson and Associates. The methods of calculation follow accepted engineering practices which are approved by or set down by the Ontario Ministry of the Environment.

Baseline Conditions

The existing noise environment in the vicinity of the preferred site was established by on-site noise level measurements around the site-boundary. Year 5 (1995) and year 10 (2000) access road traffic noise levels were predicted from traffic volume data provided by M.M. Dillon Limited.

The basic criteria for assessing noise impact were derived from the Ontario Ministry of the Environment noise pollution control publications.

Status of Data

Section 2.0 of the report describes the methodology followed in deriving noise level data for the site vicinity and access routes with and without the OWMC facility. Sections 3.0 to 6.0 analyze noise generation and impact from Construction, Plant Operations, Landfill Operations and Access Route Traffic. Section 7.0 discusses the noise impact at potentially sensitive locations and tables 13 to 15 and table 18 set out the predicted noise impact data. Section 8.0 outlines the recommended noise level monitoring program and Section 9.0, and tables 16 and 17 describe the possible noise mitigation measures.

Assessment of Noise Impact

Noise impact in this report is assessed as set out in the following table. This assessment is generally followed by the Ontario Ministry of the Environment.

Increase in Level Over Ambient	Loudness	Impact Rating
Up to 3 dBA	Hardly perceptible	Marginal or none
4 to 5 dBA	Noticeable	Low
6 to 10 dBA	Almost twice as loud	Moderate
11 plus dBA	More than twice as loud	High

Noise impact is assessed for 96 potentially noise sensitive residences and 70 potentially sensitive barn locations. These locations and the relative noise impact data are set out on Tables 13 to 15 and 18.

Monitoring

Section 8 of the report discusses the proposed on-site and off-site monitoring as well as the timing for establishing the base line conditions. The proposed monitoring program involves both periodic and continuous monitoring of equipment and operational

sound levels. The monitoring program will assist the plant operators in the early detection of faulty equipment or upset conditions and will reduce the significance of the public's negative reaction if the sound levels exceed the established ambient as corrective measures could be taken prior to receiving the complaints.

Mitigation Measures

Section 8 of the report outlines possible noise mitigation measures for plant and landfill operations. Plant mitigation measures include specifications of quiter equipment, design of enclosures, baffles, barriers, silencers and the like fittings. Other measures aimed at reducing the sound levels at potential receivers are also feasible including the provision of central air conditioning and improvements to exterior windows and doors. The reduction of sound levels due to landfill operations at potential receiver locations could be achieved by application of mitigation measures at the source and/or the receiver. The measures include specifications of quiter equipment, use of sound barriers around the active fill area, use of local sound barriers at receiver locations, improved building components at the residences and the provision of central air conditiong. A combination of the above measures will result in acceptable sound levels.

Conclusions

The Ministry of the Environment assesses noise impact during construction on the basis of noise level limits for the individual items of heavy equipment used at the construction site. Publications NPC-115, "Construction Equipment" and NPC-118, "Motorized Conveyances" set out the allowable noise levels from the equipment at source. All equipment operated on site during construction will be required to meet the MOE requirements.

The MOE will assess noise level impact from plant operations against either the existing ambient noise levels or Leq 40 dBA whichever is highest. Residence 49 will have a low impact for 150,000 t/a operations and a moderate impact for 300,000 t/a operations. All other residences and barns will have no impact or marginal impact from noise generated by plant operations.

The MOE will assess noise level impact from landfill operations against a limit of Leq 55 dBA. Predicted noise level data for landfill operations is set out on Tables 13 and 19. Noise impact against the MOE criteria is set out on Table 14 and noise impact assessed against ambient noise level criteria is set out on Table 15. Landfilling will be carried out as a continuous operation moving at a rate of 50 m per year at the 150,000 t/a operating level.

The landfill operations noise data has been derived for operations in each of the four corners of the site. It should be borne in mind that the data in the noise level tables apply only when the operations are at a particular area.

Landfill operations noise level impact, assessed against the MOE criteria is summarized as follows:

Item	From Landfill Operations			
	Northwest	Northeast	Southwest	Southeast
Total locations exceeding criteria by 4 to 5 dBA				
- Residence	0	1	0	1
- Outdoor Living Area	0	0	0	0
Total locations exceeding criteria by 6 to 10 dBA				
- Residence	3	3	0	1
- Outside Living Area	2	3	0	1
Total locations exceeding criteria by 11 dBA or more				
- Residence	1	1	1	0
- Outdoor Living Area	0	0	1	0

1.0 INTRODUCTION

1.1 PURPOSE

The services of S.S. Wilson and Associates were retained to assess the noise impacts associated with the OWMC proposal for the development of special treatment and disposal facilities for industrial waste materials in Ontario.

This report documents the noise impact studies carried out as part of Phase 4B of the Ontario Waste Management Corporation's (OWMC) Facilities Development Process. Phase 4B involves detailed assessments of the preferred site and surrounding area based on several disciplines, including noise impact.

The specific objectives of Phase 4B are to:

1. Define the existing environmental conditions (baseline) of the preferred siting option.

2. Predict and assess potential noise impacts that may be associated with the proposed facility design and operations.

3. Identify appropriate mitigative measures to minimize the potential noise impacts associated with the proposed facility design and operations.

4. Identify monitoring programs that will be implemented to assess the effectiveness of the design and operations in minimizing noise impacts.

5. Prepare documentation to meet the requirements of the Ontario Environmental Assessment Act.

In assessing noise impact the Phase 4B studies have focussed on a comprehensive noise analysis for the construction period, process plant operations, landfill operations and access route traffic for the preferred integrated site. Accordingly this report documents predicted noise impact at potentially noise sensitive locations in the area associated with development and operation of the proposed facilities. The report includes possible mitigative measures and a recommended monitoring program.

Figure 1 illustrates the Facilities Development Process followed in site selection and assessment.

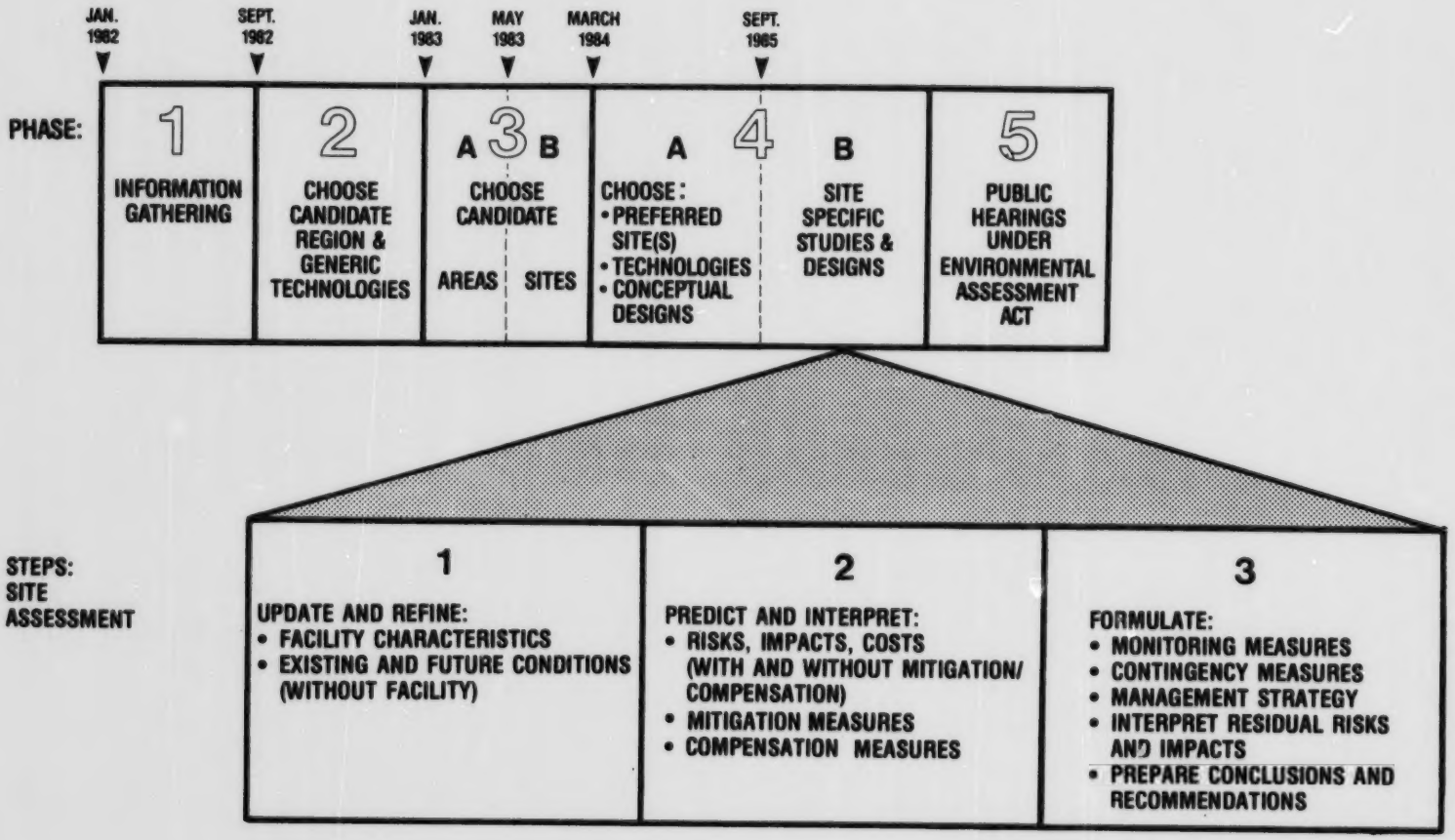


FIGURE 1
Facilities Development Process

1.2 DEFINITIONS

Some of the terms used in this Report may require an explanation.

AADT: is the abbreviation for Annual Average Daily Traffic and refers to the average daily volume of vehicles (cars and trucks) on a roadway for a calendar year.

Ambient noise level: in the context of this report ambient noise level is the noise level existing in an area or at a receptor without the addition of any noise which may be generated by OWMC operations.

dBA: The decibel (dB) is a dimensionless measure of sound pressure level. "A weighting"is the frequency weighting characteristic intended to approximate the relative sensitivity of the normal human ear to different frequencies (pitches) of sound.

E.O.P. (e.o.p.): is the edge of pavement (or of gravel surface) of the road or highway which is being referred to in the text.

Heavy Trucks: Cargo vehicles having 3 or more axles Generally, the vehicle gross weight is more than 12,000 Kg. Buses are also classified as heavy vehicles.

High Solids Operation: Treatment required for wastes having a relatively lower concentration of water and consequently a higher solids constituent.

Leq: The equivalent energy sound level (Leq) is the value of the constant sound level which would result in exposure to the same total A-weighted energy as would the specified time-varying sound, if the constant sound level persisted over an equal time interval. It is measured in dBA.

Medium Trucks: Cargo vehicles having 2 axles and 6 wheels. Generally, the vehicle gross weight is within the range 4500 to 12,000 Kg.

Pascal: is a unit for measurement of pressure expressed in the International System (SI) of Units.

R.R.: is an abbreviation for Regional Road.

Sound level: is the weighted sound pressure level.

Sound power level: (abbreviated PWL) is the acoustic power radiated by a sound source. In decibels, it is 10 times the logarithm (to the base 10) of the ratio of the sound power radiated by the source to a reference power of 10

Sound pressure level (SPL): in decibels, at a point is 20 times the logarithm (to the base 10) of the ratio of the effective pressure of a sound (at the point) to a reference pressure of 20 micro pascals

Typical Operation : Treatment required for wastes having a typical or average water-to-solids ratio.

1.3 BACKGROUND

At the end of the Phase 3B program, eight candidate sites were selected. During the Phase 4A program the possible noise impacts on the site vicinities and along the access routes were examined for these eight candidate sites.

The noise environment analyses for Phase 4A were based on data provided by M.M. Dillon Limited, Monenco Limited, and on-site noise data measured by S.S. Wilson and Associates. M.M. Dillon Limited provided data for identification of site access routes, existing and year 2000 forecasted traffic volumes (medium and heavy truck percentages) for local and regional access routes and year 2000 OWMC truck volume forecasts for access roads leading to each candidate site. Monenco Limited provided data for location of the operating plant within each candidate site, preliminary plant layout, identification of noise generating equipment (i.e. noise sources) and their location within the plant, landfill cell operations, and a preliminary schedule for daily operations.

These data were used to forecast noise level data for each candidate site and for local and regional access routes. Noise analyses were prepared for three cases:

- Case 1 - Integrated Landfill and Plant
- Case 2 - Separate Landfill
- Case 3 - Separate Incinerator

In relation to these three cases, analyses were carried out for fourteen possible combinations of the eight candidate sites. Five noise environment reports and two supplementary reports were produced covering "Methodology", "Traffic Noise Along Access Routes - Partial Solidification", "Train Noise Trends" and "Site Noise Level Contours". The reports included ambient and predicted future noise level data and noise level contour drawings for the fourteen possible combinations, noise data and contour drawings for OWMC typical operating plants and preliminary mitigation measures for reducing noise impact at candidate sites.

The noise study data were applied by other consultants as part of the extensive overall impact assessment during the detailed comparative evaluation of sites and site

combinations. The comparative evaluation of the overall impact assessment indicated site LF-9C as the preferred site with integrated plant and landfill operations.

The preferred site is located in the Township of West Lincoln. The site location is shown on Figure 2. It is bounded:

- To the north by Highway 20
- To the east by Schram Road
- To the south by Vaughan Road
- To the west by agricultural land.

The site comprises Lot 18 and Part of Lot 17, Concession III.

It is expected that the quantity of waste treated in the start-up year will be 50,000 tonnes increasing to 150,000 tonnes per annum by year 5 and increasing to 300,000 tonnes per annum by year 10 if such expansion is required. The Phase 4B noise analysis is based on the initial construction period and on year 5 and year 10 operations stages.

1.4 OBJECTIVES AND SCOPE OF THE NOISE ENVIRONMENT STUDY PROGRAM

The objectives and scope of the Phase 4B evaluation works include the following:

1. To determine the existing noise levels in the area by carrying out ambient noise level measurements around the site and along the preferred access route (R.R.24 south from the QEW to Hwy. 20 west to Schram Rd.).

2. To predict future noise levels in the vicinity and along the preferred access route with and without the proposed facility. This includes prediction of noise levels generated by:

   - Facility and perimeter earth works.

   - Initial landfill development (during facility construction period.

   - Plant operations at the 150,000 tonnes per annum and 300,000 tonnes per annum levels.

   - Ongoing landfill development at year 5 and year 10 levels with daily landfill operations.

   - OWMC-generated truck traffic along the road access route.

Township of West Lincoln, Regional Municipality of Niagara. Local Detail.

OWMC Ontario Waste Management Corporation

FIGURE 2: PREFERRED SITE

3. To predict and evaluate noise impact at potentially sensitive receptors in the vicinity of the site due to noise levels generated by facility operations.

4. To examine possible mitigation measures in order to minimize noise impact on the potentially sensitive receptors.

5. To identify a noise monitoring program to check the effectiveness of mitigation and to assess changes in noise levels from facilities operations or in the ambient noise level environment.

6. To prepare a Phase 4B Noise Environment Study Report meeting the requirements of the Environmental Approvals and Land Use Planning Branch of the Ontario Ministry of the Environment and ultimately the requirements of the Environmental Assessment Act.

1.5 REPORT ORGANIZATION

This Report presents the methodology for noise level predictions and assessment of impact, the measured ambient noise level data, predicted noise levels for access route and predicted noise levels for each design capacity of the plant and landfill operations. The report data is sequenced as set out in the Table of Contents.

Seven noise level contour drawings have been produced on 1:20,000 scale drawings which form an integral part of this Report. The drawings listed below are appended to this report.

- W85-248-A: Plant Operations Noise Level Contours

- W85-248-H: Landfill Operations Noise Level Contours Northwest Quadrant

- W85-248-I: Landfill Operations Noise Level Contours Northeast Quadrant

- W85-248-J: Landfill Operations Noise Level Contours Southeast Quadrant

- W85-248-K: Landfill Operations Noise Level Contours Southwest Quadrant

- W85-248-G: Construction Period Leq Noise Level Contours Highest Activity Month.

1.6 TYPICAL SOUND LEVELS

The following typical sound levels for familiar sound sources are included to establish a basis for general comparison of noise levels. (The levels are with reference to a level of 20 micro pascals).

ITEM	dBA
Threshold of pain	140
Jet engine at 70 m	125
Rivetting machine at 30 m	90
Diesel truck passby at 15 m	85-93
Lawn mower at 3 m	85-90
Farm tractor at 3 m	85-90
Freight train passby at 30 m	73
Vacuum cleaner at 3 m	70
Conversational speech	55-65
General offices	55-65
Library	40-45
Soft whisper at 3 m	35-40
Threshold of hearing	0

1.7 EXISTING NOISE LEVELS

1. Preferred Site Noise Levels

In order to assess existing noise levels in the immediate site vicinity "on-site" noise measurements were made over 24 hour periods at each of four locations during the period from January 11 to 13, 1986. The locations are shown on Figure 3 and are described as follows:

Location 1:

20 m south of the edge of pavement of Highway 20 approximately midway along the northern side of the site.

Location 2:

20 m west of the edge of the gravel surface of Schram Road approximately midway between Highway 20 and Vaughan Road.

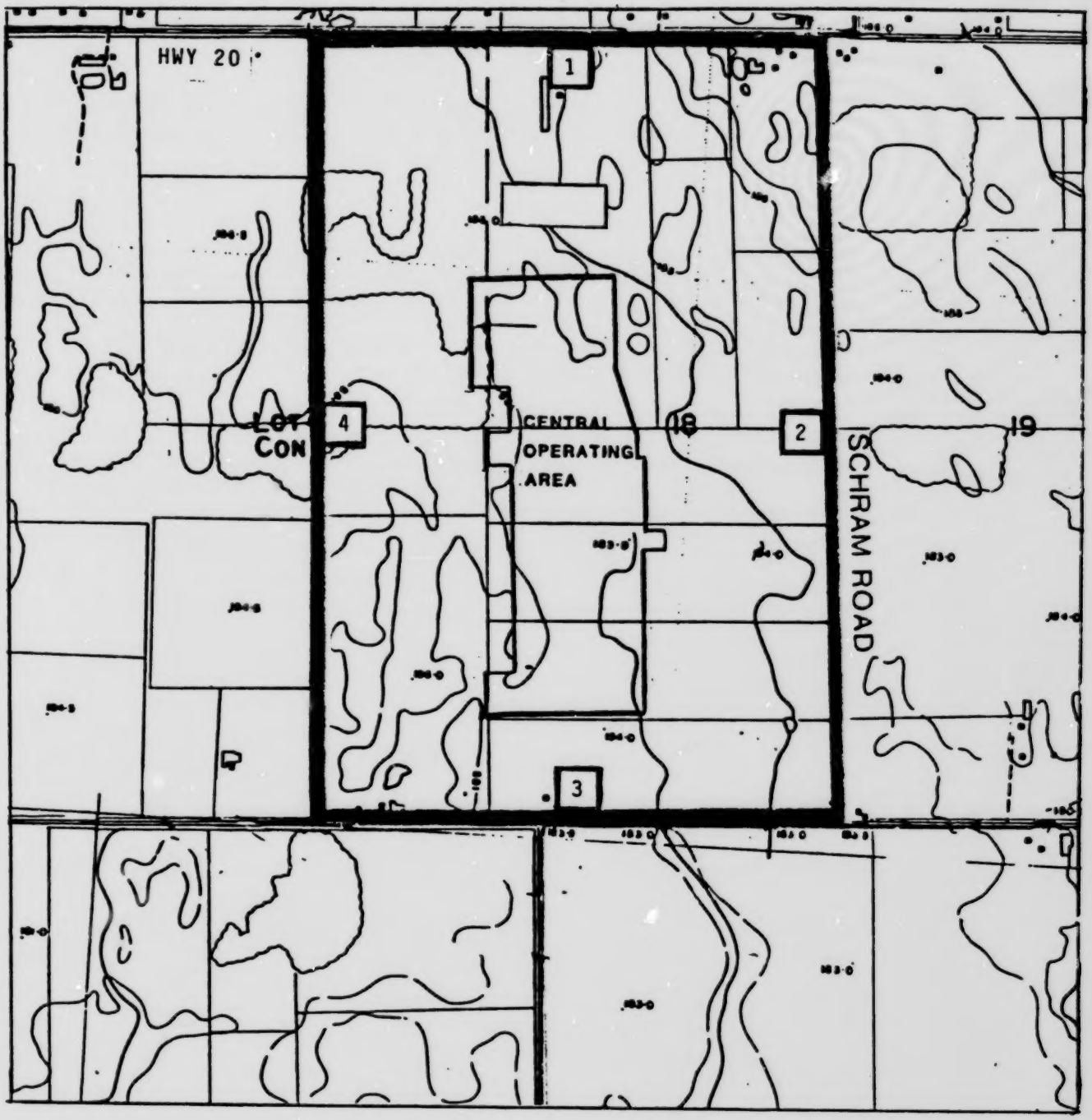


FIGURE 3: LOCATION OF AMBIENT SOUND LEVEL MEASUREMENT LOCATIONS 1 TO 4. PREFERRED SITE

Location 3:

20 m north of the edge of the gravel surface of Vaughan Road approximately midway along the southern side of the site.

Location 4:

Approximately 20 m east of the western perimeter of the site and approximately midway between Highway 20 and Vaughan Road.

The measured hourly Leq data for each of the four site locations are set out on Table 1.

2. Access Route Noise Levels

Noise level measurements were made along Regional Rd. 24 and along Highway 20 for comparison with predicted noise levels. The measurements were made over 24 hour period at 3 locations on Regional Road 24 and at 1 location on Highway 20. All readings have been adjusted to a distance of 20 m from edge of pavement (E.O.P.). Measurements were made during the period from September 16 to 19, 1986.

Regional Road 24

- Location A: 86 Victoria Avenue South.
- Location B: 362 Victoria Avenue North.
- Location C: Between Regional Road 216 and Highway 20.

Highway 20: Along north side of the preferred site.

These data are summarized as follows:

	Leq (dBA) at 20 m from E.O.P. 07:00 to 23:00	23:00 to 07:00
RR24 - Location A	68	63
Location B	69	66
Location C	66	62
Highway 20	61	54

1.8 SOURCE OF DATA

All data used for noise level prediction purposes such as equipment complement, equipment noise levels, operating hours, plant and site layout drawings were provided by Monenco Ltd.. Information on access routes, existing and future road traffic volumes without OWMC, and future road traffic volumes due to OWMC were provided by M.M. Dillon Limited.

2.0 METHODOLOGY

2.1 NOISE LEVEL PARAMETERS AND INSTRUMENTATION

The equivalent energy noise level parameter (Leq in dBA) has been selected for use as the primary noise level descriptor by the Ontario Ministry of the Environment and is used as the primary descriptor in their Model Municipal Noise Control By-Law. This Model By-Law is the basis for noise control regulations in the various municipalities in Ontario.

Since the noise levels around the OWMC site will be subject to M.O.E. approvals the Leq descriptor is used to identify OWMC noise levels in this Report.

All instrumentation used for on site measurements meets the specifications set out in M.O.E. Publications NPC-103 "Measurement Procedures".

2.2 CONSTRUCTION NOISE LEVELS

Noise levels from construction equipment are assessed against the Ontario Ministry of the Environment Publication NPC-115 "Construction Equipment" and Publication NPC-118, "Motorized Conveyances". These publications do not set noise level limits at construction sites but set limits for noise generated by the equipment used on construction sites. M.O.E. approvals will be based on whether or not the equipment meets the requirements (copies of relevant M.O.E. publications are included in Appendix and also referenced in Section 10).

Although it is not required by the M.O.E., for OWMC reference purposes a noise level contour drawing (W85-248-G) has been produced showing predicted noise levels in the site vicinity for the "worst month" construction period. This is taken as the month with the highest construction activity and the most equipment on site.

The contours have been developed by dividing the plant construction area into ten sub-areas and assigning equipment against each area for an 8 hour operating day. Reference was made to the U.S. Environmental Protection Agency document "Noise From Construction Equipment and Operations" PB206 717. This document shows that, during general construction work (such as the OWMC plant), average "usage periods" for heavy equipment items (such as bulldozers, graders,

scrapers, trucks) are approximately 40% and for items such as cranes are approximately 16% of the shift time. The usage periods are times equipments are operating at high noise levels (e.g. full load conditions) rather than idling or turned off.

The site equipment and truck usage during the OWMC construction period is set out on Table 3.

The contour data were generated using a computer programmed to calculate noise levels, at grid points around the site, from multiple noise sources. The noise sources (included in each sub-area) were interpolated to a point noise source at the centre of each of the sub-areas. The computer program takes into account:

- Reference noise levels and reference distances for each sub-area point source.
- Elevations of noise sources.
- Elevations at grid points at 1.5 m above ground level.
- Distance (divergence) attenuation.
- Ground attenuation (as modified by source and receiver heights).
- Equipment utilization time.
- Berm attenuation (where applicable).

2.3 PLANT OPERATIONS NOISE LEVELS

Noise levels generated by plant operations (year 5 and year 10) were predicted on the basis of data provided by Monenco (1987). This data set out the equipment type, location and sound power levels for all outdoor noise sources at the various plant buildings. The data also included site plans and plant layout drawings. (See Table 2 and Figures 4 and 5).

Sound pressure levels (SPL) were calculated from sound power levels (PWL), treating the noise source as generating the noise hemispherically as follows:

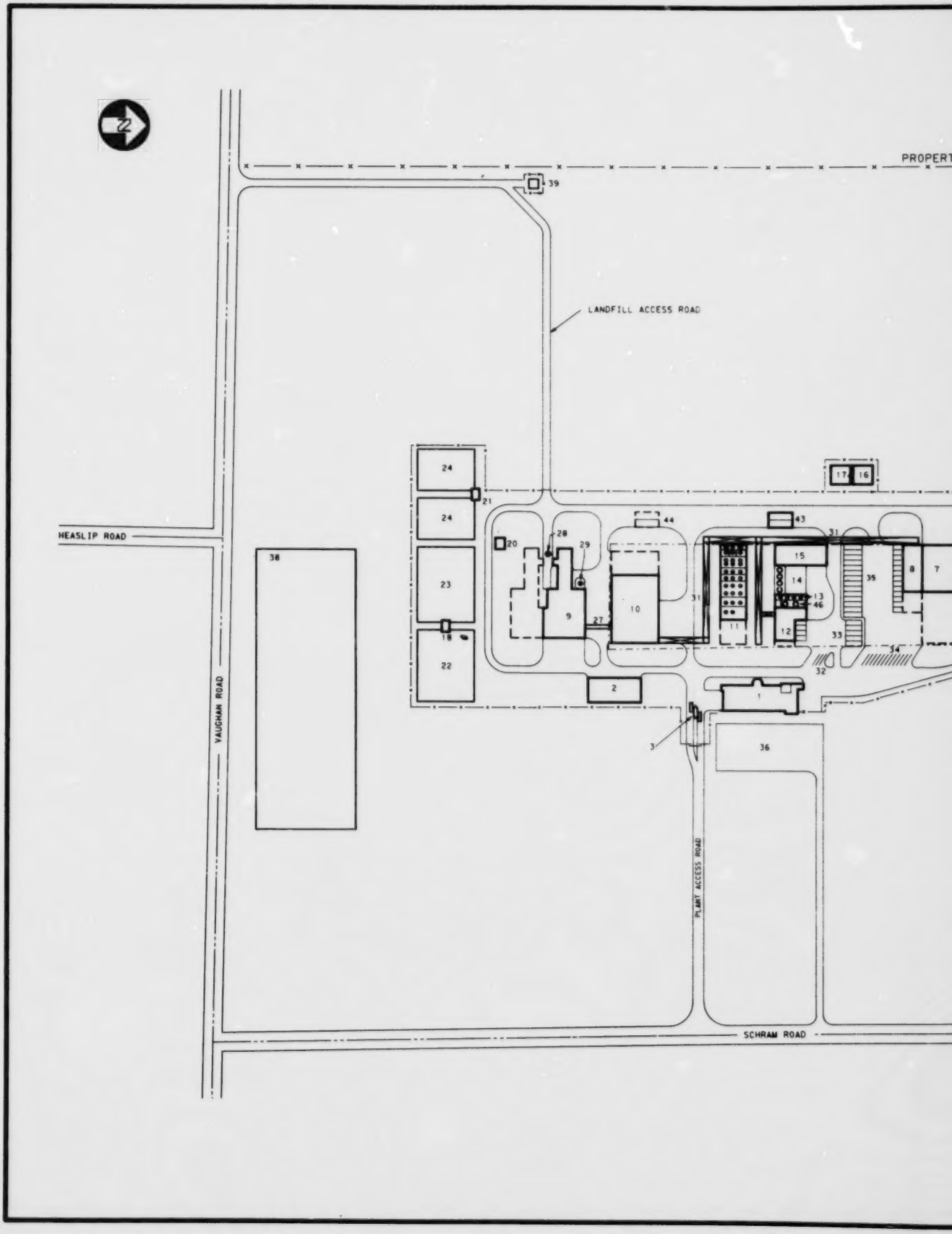
$$SPL = PWL - 20 \log d - 10 \log 2\pi$$

Where d = distance (m) from the noise source to the receptor.

PWL is reference 10^{-12} watts

SPL is reference 20 micro pascals.

For d = 1 m, SPL = PWL - 8.


PROPERT
LANDFILL ACCESS ROAD
HEASLIP ROAD
VAUGHAN ROAD
PLANT ACCESS ROAD
SCHRAM ROAD
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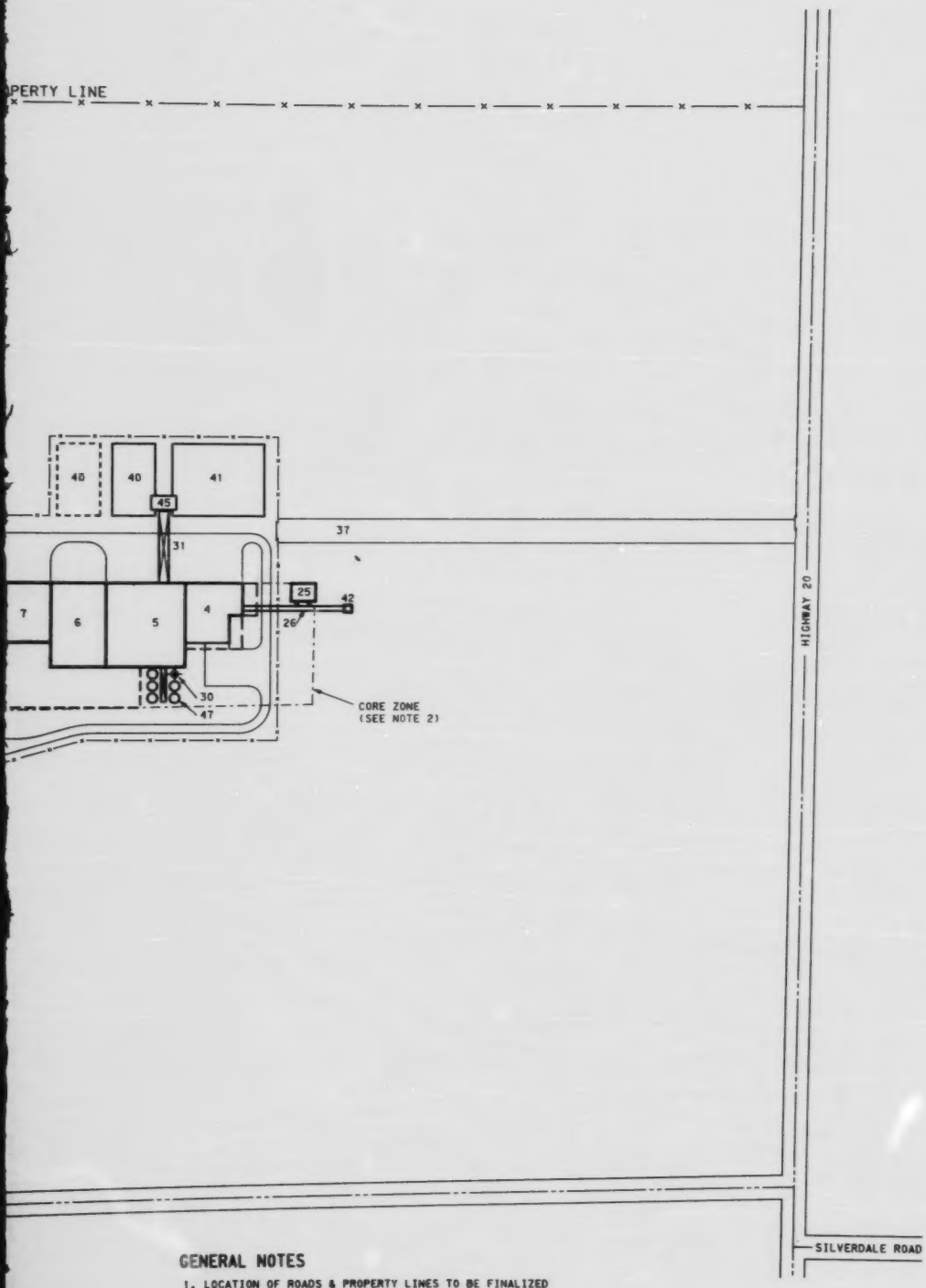


LEGEND

1. ADMINISTRATION BUILDING
2. MAINTENANCE BUILDING
3. GATEHOUSE & WEIGH SCALES
4. SOLIDIFICATION PLANT
5. PHYSICAL/CHEMICAL TREATMENT PLANT
6. PHYSICAL/CHEMICAL STORAGE TANK AREA
7. INORGANIC DRUM STORAGE & HANDLING BUILDING
8. INORGANIC TANK TRUCK UNLOADING AREA
9. INCINERATION PLANT
10. ORGANIC DRUM STORAGE & HANDLING BUILDING
11. INCINERATOR TANK FARM
12. ORGANIC TANK TRUCK UNLOADING AREA
13. INCINERATOR WASTE RECEIVING TANKS
14. SEGREGATED ORGANIC STORAGE TANK AREA
15. STORAGE BUILDING
16. MAIN SUBSTATION
17. EMERGENCY POWER STATION
18. SURFACE WATER PUMPHOUSE
19.
20. RAW WATER TREATMENT PLANT
21. FIREWATER PUMPHOUSE
22. SURFACE WATER POND (POTENTIALLY CONTAMINATED
23. SURFACE WATER POND (UNCONTAMINATED)
24. FIREWATER POND
25. SOLIDIFIED MATERIAL INTERIM STORAGE BUILDING
26. SOLIDIFIED MATERIAL CONVEYOR
27. DRUM CONVEYOR
28. INCINERATOR STACK
29. AUXILIARY BOILER STACK
30. EVAPORATOR STACK
31. PIPERACK
32. TEMPORARY TRUCK HOLDING AREA (ORGANIC)
33. TRUCK HOLDING AREA (ORGANIC)
34. TEMPORARY TRUCK HOLDING AREA (INORGANIC)
35. TRUCK HOLDING AREA (INORGANIC)
36. CAR PARK
37. EMERGENCY ROAD, HYDRO & GAS CORRIDOR
38. LANDFILL STORM DETENTION POND
39. METEOROLOGICAL/AIR MONITORING STATION
40. RECYCLE WATER POND
41. EVAPORATOR FEED POND
42. TRUCK LOAD OUT STATION
43. TRUCK WASH STATION
44. TRUCK WASH STATION (FUTURE)
45. EVAPORATOR/RECYCLE PUMP HOUSE
46. FUEL OIL TANKS
47. EFFLUENT STORAGE TANKS

GENERAL NOTES

1. LOCATION OF ROADS & PROPERTY LINES TO BE FINALIZED FOLLOWING CONFIRMATION BY AERIAL AND/OR LEGAL SURVEY
2. CORE ZONE IS DEFINED AS AN ENVELOPE 400M FROM THE SITE BOUNDARIES, AS ESTABLISHED BY OWMC

FIGURE 4
SITE PLAN

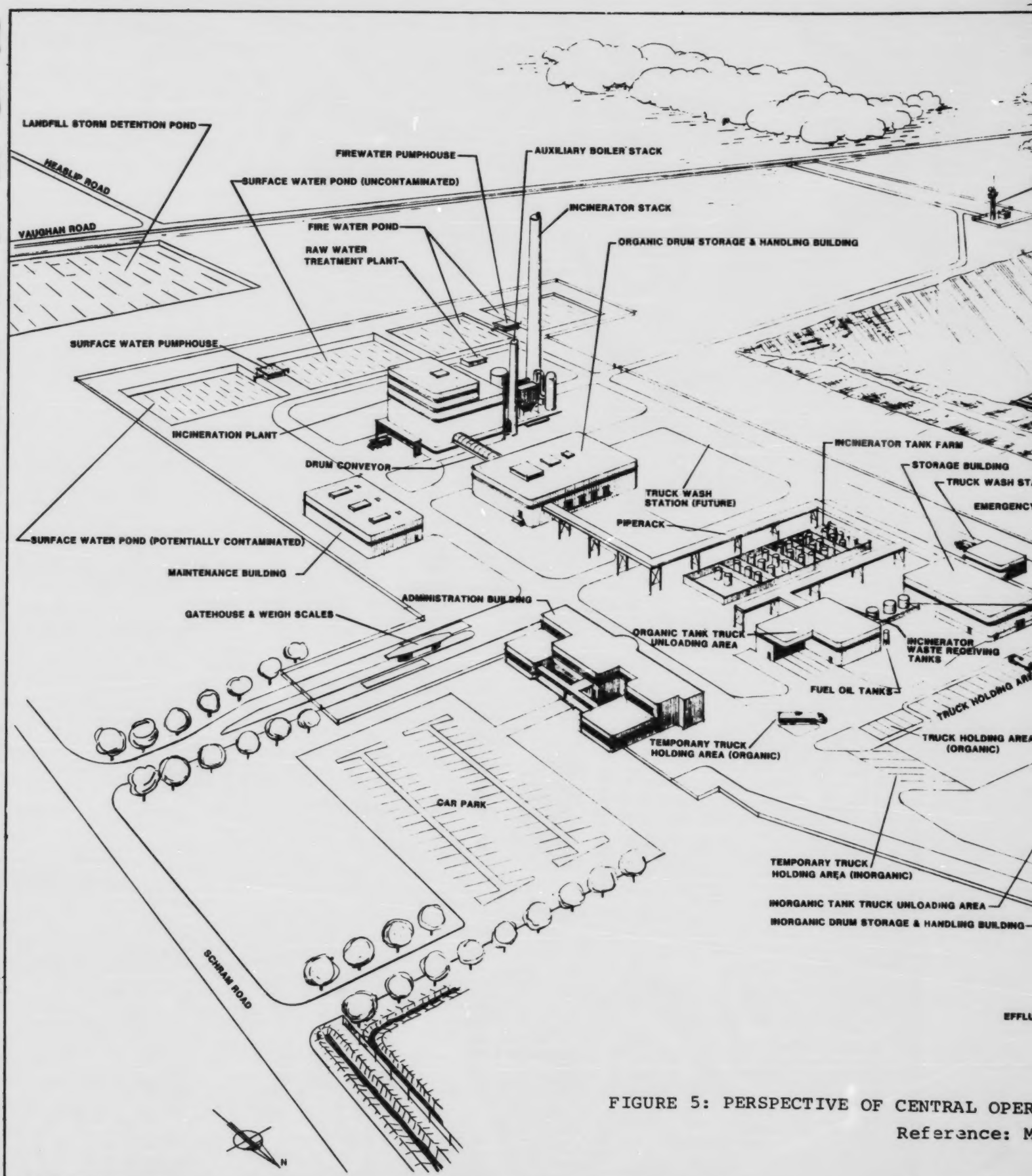
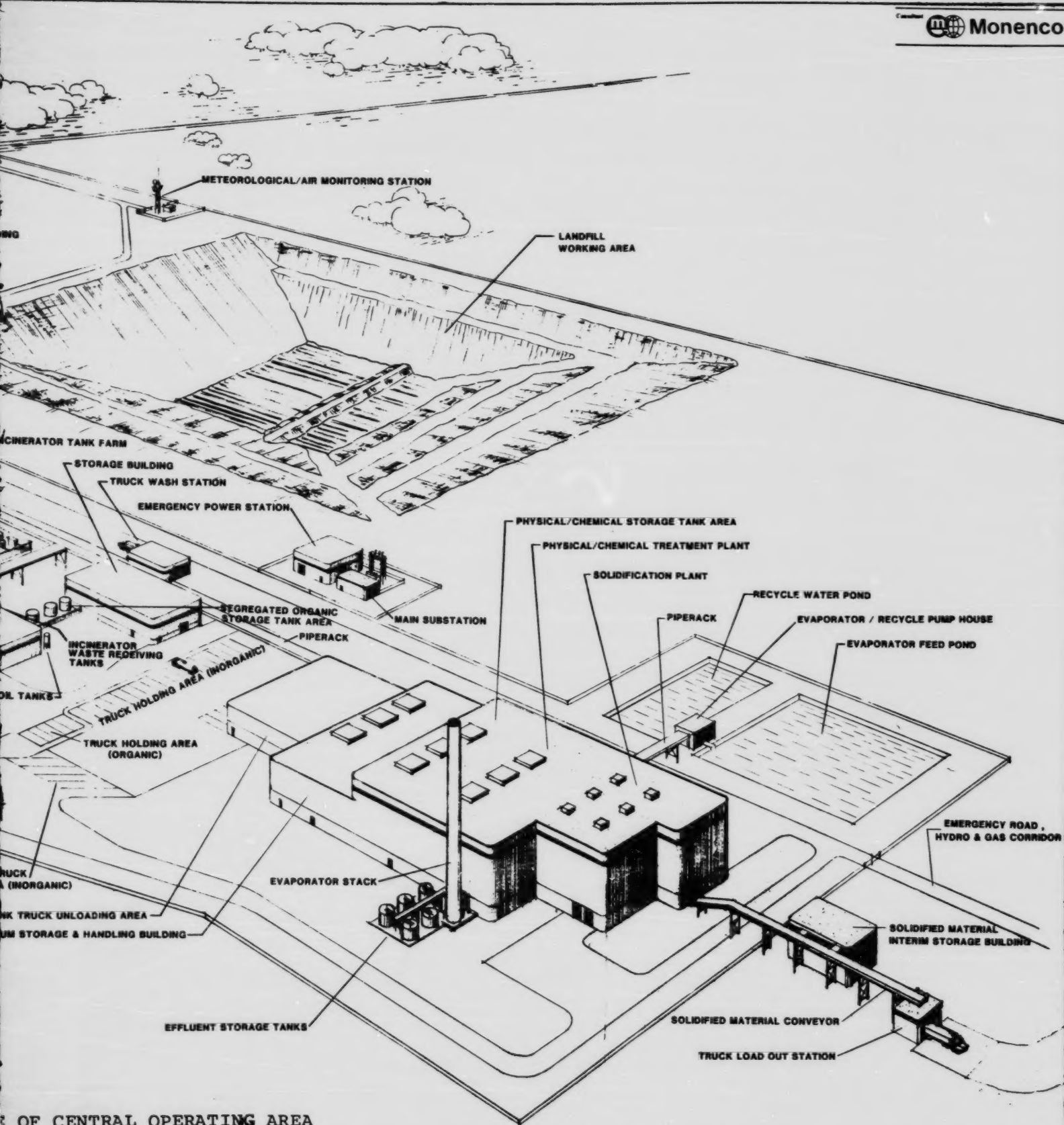


FIGURE 5: PERSPECTIVE OF CENTRAL OPER

Reference: M



OF CENTRAL OPERATING AREA

Reference: Monenco (1987).

PERSPECTIVE OF CENTRAL OPERATING AREA

Since the plant noise sources will have a pronounced tonal quality a correction factor of +5 dBA was applied to all sources (as per Ministry of the Environment Publication NPC-104, "Sound Level Adjustments").

Plant noise level contours were established using a computer programmed to calculate noise levels at grid points from multiple noise sources. The overall plant layout is shown on Figure 3 which sets out 47 plant functions/areas. The data for outdoor noise sources for each of the 47 areas (i.e. equipment types and reference noise levels) are set out on Table 2. The noise sources for each of the areas were interpolated to a point noise source at the centre of the area. The computer program takes into account:

- Reference noise levels and reference distances for each of 47 plant areas.

- Elevations of noise sources.

- Elevation at grid points at 1.5 m above ground level.

- Distance (divergence) attenuation.

- Ground attenuation (as modified by source and receiver heights).

- 100% (24 hour) equipment utilization.

- Berm attenuation where applicable.

Impact from plant noise was assessed at potentially sensitive locations in the site vicinity as follows:

- Along Highway 20 site noise impact was assessed on the basis of Ministry of the Environment Publication NPC-105, "Stationary Sources" which states:

  "For sound from a stationary source, including Quasi-Steady impulsive sound, if the sound level is expressed in terms of the one-hour equivalent sound level (Leq), the applicable sound level limit is the one-hour equivalent sound level (Leq) caused by road traffic for that point of reception and the same time."

  Hourly noise level measurements were made at 20 m from the edge of pavement of Highway 20 (detailed data are reported in Section 1.0 of this Report). The lowest hourly Leq - daytime (i.e. during 07:00 to 23:00 hours) was 56 dBA during 20:00 to 21:00 hours and the lowest hourly Leq - night-time (i.e. during 23:00 to 07:00 hours) was 47 dBA during 03:00 to 04:00 hours. These levels were extrapolated to 57 and 48 dBA by comparison with 1995 traffic data for Highway 20(traffic being the primary noise source). These are ambient levels and do not include OWMC-generated

noise. Plant noise impact at sensitive locations along Highway 20 was then assessed against these day/night criteria of 57/48 dBA at 20 m from the edge of pavement. Since the estimated annual traffic growth rate for Highway 20 is on 0.58% (see Appendix 2) the year 2000 traffic noise levels will increase by less than 0.5 dBA over the 1995 noise levels. Therefore the 57/48 dBA data also applies for year 2000.

- Along the east, south and west site perimeters the area is classed as "rural" since Leq road noise levels are very low. Noise impact in these areas was assessed on the basis of the Ministry of the Environment Publications NPC-132, "Guidlines for Noise Control in Rural Areas". The applicable criteria from this publication will be item 8 which states:

"No restrictions should apply to any stationary source resulting in an equivalent sound level (Leq) or ninetieth percentile sound level (L90) of 40 dBA or less within 30 m of a dwelling or a camping area."

2.4 LANDFILL OPERATIONS NOISE LEVELS

Noise levels generated by landfill operations have been predicted from data provided by Monenco Limited (see Section 5.0 of this Report). This data set out the equipment type, number of units and sound pressure levels for equipment which will operate during an 8 hour daylight shift 5 days per week. The only landfill operations which may occur after 19:00 hours daily would be the transfer of material from the solidification plant to the landfill by pipeline. This function would not entail any heavy landfill equipment.

Since the landfill operation is a moving function (i.e. the operation moves along the site gradually as the entombment area is filled and capped) noise level data has been generated for 4 working area locations, one at each corner of the site. Noise level contours have been developed for each of these "corner" working areas and specific data has been predicted for noise levels at potentially sensitive noise locations in the site vicinity.

All distance references for noise sensitive locations have been scaled from drawings provided by M.M. Dillon Limited and the noise level contours have been drawn on 1 : 20,000 scale drawings.

Noise level impact from landfill operations has been assessed on the basis of one 8 hour daylight shift per day with no landfill operations occurring after 19:00 hours daily. The time period is of importance since the Ministry of the Environment

Guidelines require that noise levels from landfill operations be assessed against the following criteria:

07:00 to 19:00 hours - Leq 55 dBA at the nearest receptor

19:00 to 07:00 hours - Leq 45 dBA at the nearest receptor

The guidelines also provide that if existing noise levels are in excess of the noted limits (e.g. along Highway 20 or the Toronto, Hamilton, Buffalo Railway) then the existing levels can be used as the criteria (see M.O.E. letter of January 21, 1980 in Appendix).

Landfill operations noise level data were established using computer programs to calculate noise levels at multiple receptors (or grid points) from multiple noise sources.

For calculation purposes the landfill operations area was regarded as three sections - cover, fill and excavation, each divided into six noise time zones. (This is an arbitrary division allocating the noise generators working in a specified area or zone for a specified time period). The on site roads carrying waste and granular material to the fill and carrying excavated clay to the cover and to off site were also divided into noise time zones.

Noise level data was developed for each noise time zone based on equipment and equipment usage provided by Monenco (1987) and based on information on truck movement data supplied by Dillon (1987).

Four modes of operation were analyzed:

150,000 tonnes/annum - typical operation
150,000 tonnes/annum - high solidified waste mode
300,000 tonnes/annum - typical operation
300,000 tonnes/annum - high solidified waste mode.

A perspective view of the operating area is shown on Figure 5 and a Typical Landfill Area is shown on Figure 6.

The equipment and truck complement required for each mode of landfill are set out on Tables 4 to 7 and the reference noise level values are set out on Table 8.

Noise level data were developed for landfill operations in each of the four corner areas of the site for each of the four modes of operation. The data provided noise levels at potentially sensitive locations in the site vicinity and noise level contours were developed for the 300,000 tonnes/annum typical operation mode.

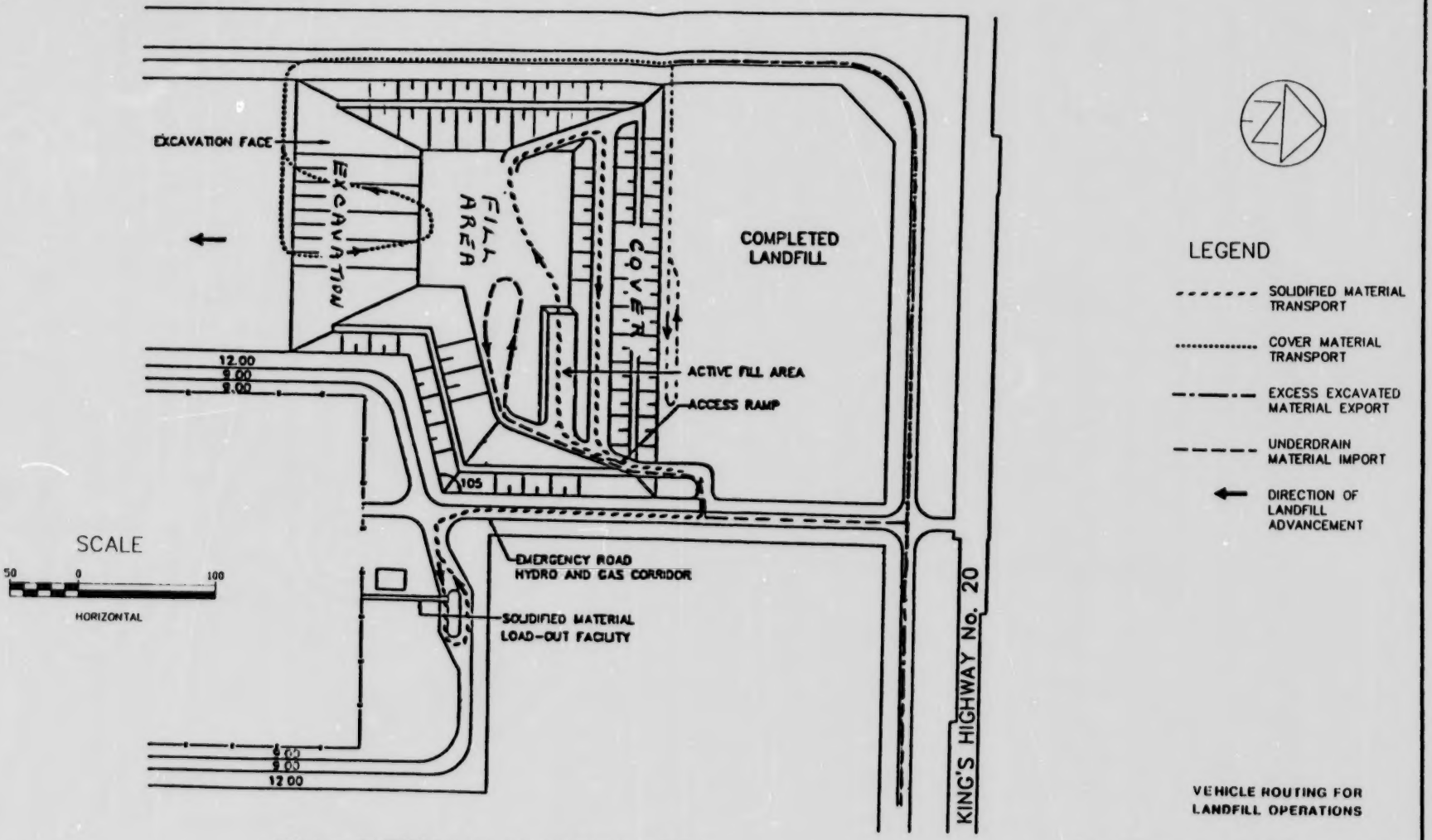


Figure 6: TYPICAL LANDFILL AREA

Reference : Dillon (1987)

Calculations were carried out using a computer programmed for multiple noise sources and multiple receivers. The program takes into account:

- Reference noise levels and reference distances for the landfill equipment working in each noise time zone.
- Reference noise levels and distances for trucks travelling between the excavation area, the landfill cover and off site, and for trucks carrying granular material and waste materials to the fill area.
- Time/speed (25 km/hr)/traffic volume factor for truck movements in each noise time zone.
- Utilization factor and time above ground factor for heavy equipment in the fill area. Equipment was treated as operating 100% of the time either in full load mode or idling mode.
- Divergence (distance) attenuation.
- Berm attenuation where applicable.
- Ground attenuation (as modified by source/receiver elevations and the intervening berm).
- Source and receiver elevations.
- Reflections from building facades.
- Atmospheric attenuation.

Atmospheric attenuation was included in this case because of the distances between the landfill area and the potentially sensitive residences. The attenuation is applied on the basis of 1/3 octave attenuation at 20 degrees centigrade and 50% relatively humidity. No adjustment was made for altitude (i.e. above sea level) since the difference is negligible. The International Organization for Standardization (ISO) tables were used reference ISO 3891-1978(E).

The relevant table is reproduced here as Table 9. The frequency spectrum used for the calculations is shown on Figure 7. This is a typical frequency spectrum for heavy construction equipment such as bulldozers, loaders etc. (Reference EPA, 1971).

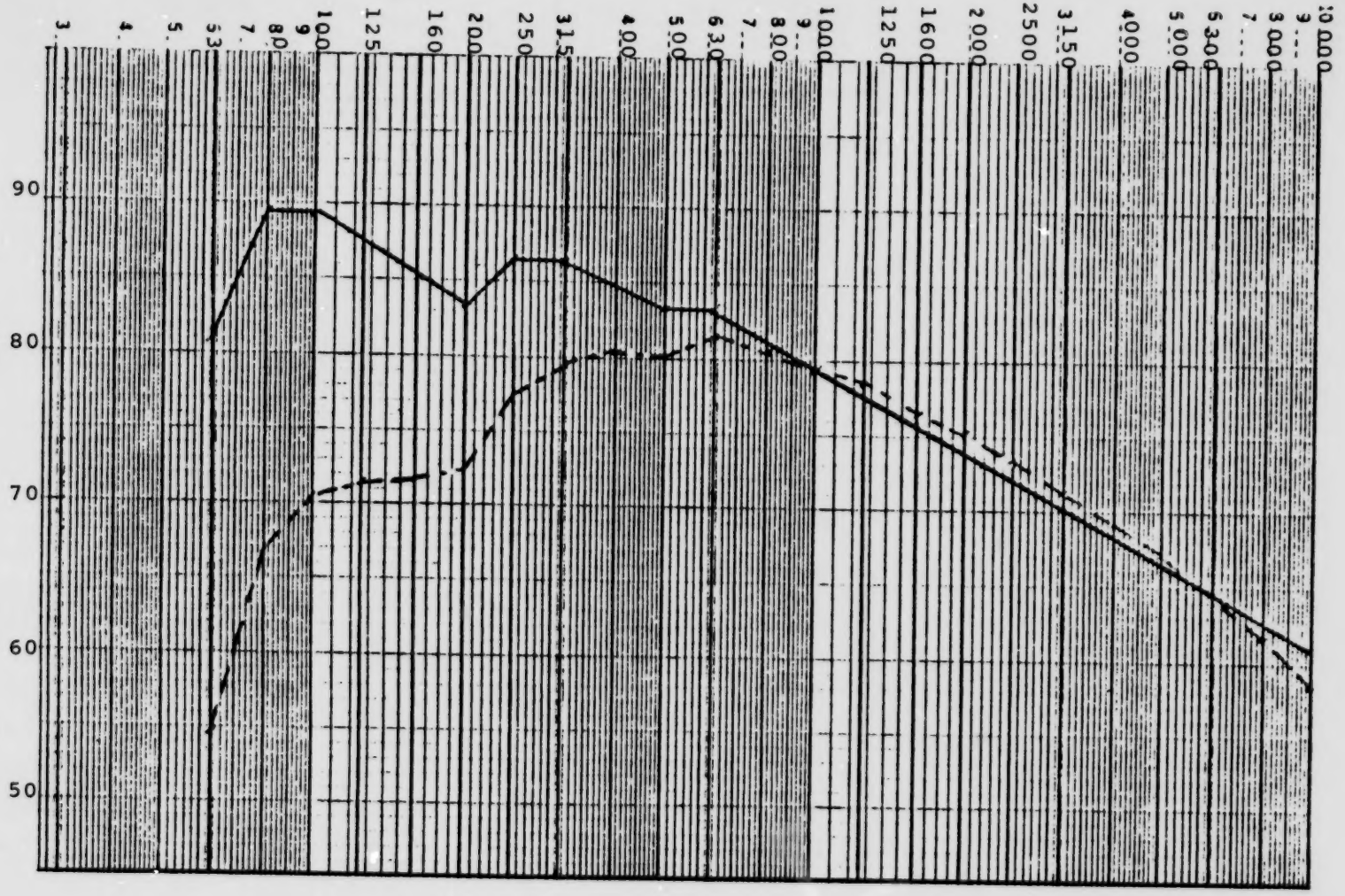


FIGURE 7: TYPICAL NOISE FREQUENCY SPECTRUM OF SOUND PRESSURE LEVELS AT 15M. MEASUREMENTS FROM 23 ITEMS INCLUDING FRONT LOADERS, BACKHOES, BULLDOZERS, GRADERS ETC. REFERENCE EPA (1971).

In this report noise impact from landfill operations has been assessed on the basis of:

- the lowest hourly Leq from Highway 20 traffic for the receptors along Highway 20 to the north of the site during landfill operations hours of 07:00 to 19:00 hours. With reference to Table 1 the lowest Leq hourly level in this period is 58 dBA (10:00 to 11:00 hrs.). This level has been extrapolated to 59 dBA for 1995 traffic data for Highway 20.

- An Leq 55 dBA for receptors to the east, south and west of the site (daytime).

  For OWMC reference purposes the noise levels at potentially sensitive locations have been assessed versus existing ambient conditions as well as versus M.O.E. criteria.

The Leq landfill noise level contour drawings do not include plant noise levels since the M.O.E. has advised that landfill and plant will be assessed against different sets of criteria and therefore require separate sets of data.

2.5 ACCESS ROAD NOISE LEVELS

Noise level predictions for access roads have been made on the basis of road traffic volumes provided by Dillon(1987) The data for access road traffic without OWMC traffic is set out on Table 10 and the data for OWMC traffic is set out on Table 11.

Leq noise levels in dBA have been calculated for the access roads (without and with OWMC-generated traffic) using the Ministry of the Environment method which became effective in January 1987. Allowance has been made for interrupted traffic flow at the intersection of Highway 20 and Schram Road.

With reference to access road traffic during construction the site working hours are 08:00 to 16:30, 5 days per week and it has been assumed that most OWMC-generated traffic will be on the access roads during 07:00 to 17:00 hours. It has also been assumed that most of the OWMC-generated traffic will be on the access roads during 07:00 to 17:00 hours when the facility is in operation.

In order to establish a "worst case" condition all OWMC-generated truck traffic and 90% of OWMC employee (cars) traffic has been applied to the 07:00 to 17:00 hours period in road traffic noise calculations.

Road traffic volumes without OWMC-generated traffic have been extrapolated to 07:00 - 17:00 hours data as follows:

AADT (07:00 to 23:00 hours) = 0.90 AADT (24 hours)

Peak hours volume (2 hours) = 2x AADT/10

Off peak hours volume (daytime) = $\frac{0.90 \text{ AADT} - 0.2 \text{ AADT}}{14}$/hour

AADT (07:00 to 17:00) =
8x Off peak hourly volume + Peak Hours Volume (2 hrs.)

This series can be summarized as:
AADT (07:00 to 17:00) = 0.6 AADT (24 hr.).

Table 11 sets out OWMC-generated two way traffic volumes (trucks and passenger vehicles) for:

1990 - Peak Month Site Construction
1995 - 150,000 t/a Operating Level
2000 - 300,000 t/a Operating Level

A lane width of 3.5 m has been used to change the edge of pavement to receiver distances to centre line of roadway to receiver distances.

2.6 AMBIENT NOISE LEVELS

In this case ambient noise levels are the existing levels at a receptor as predicted using local road traffic noise calculations where applicable and on-site measurements. A lower noise level limit of 40 dBA was applied to ambient noise levels used as a reference for assessing noise level impact (based on item 8 in MOE Publication NPC-132).

2.7 HEAVY EQUIPMENT NOISE LEVELS

The reference levels for heavy equipment (Dozers, Graders, Backhoes etc.) were Caterpillar Company ratings as provided by Monenco Limited. However the upper limit noise levels were taken at 85 dBA in accordance with the limits set out in the Ministry of the Environment Publication NPC-115, "Construction Equipment".

2.8 NOISE IMPACT RATING

Noise impact has been assessed on the following scale which is generally used by the M.O.E.:

Excess Level	Loudness	Impact Rating
Up to 3 dBA	Hardly Perceptible	Marginal or None
4 to 5 dBA	Noticeable	Low
6 to 10 dBA	Almost Twice as Loud	Moderate
11 plus dBA	More than Twice as Loud.	High

2.9 CRITERIA FOR MITIGATION

Since the Ministry of the Environment does not have guidelines for this specific application we have followed the guidelines which apply to new residential development.

- If the criteria are exceeded by up to 5 dBA, people should be advised accordingly.
- If the criteria are exceeded by 6 to 10 dBA, mitigation should be undertaken.
- If the criteria are exceeded by 11 dBA or more, mitigation must be undertaken.

2.10 WIND AND TEMPERATURE EFFECTS

Specific criteria have not been established covering the effects of wind and temperature on sound propagation. Some combination of wind and temperature gradients almost always exist in open areas. The effects of these gradients can cause sound waves to be bent upwards or downwards and can increase or decrease sound attenuation depending upon the turbulence introduced (by the wind and temperature gradients).

It is not considered practical to try and generalize on the possible combination of wind and temperature gradients and their effect on sound propagation since "average" conditions rarely exist in any particular area. The M.O.E. do not include wind and temperature effects in their criteria and this report does not include any predictions for wind and temperature effects.

3.0 CONSTRUCTION PERIOD NOISE LEVELS

3.1 GENERAL

For the purposes of this Report the "start" of construction year is taken as 1990. Although the timing set out in this Report is based on the preliminary construction plan with a spring start, a shift of activities to different seasons will not have a significant effect on the noise environment data presented for the construction period.

The preliminary construction schedule for the initial facility was provided by Monenco (1987). The construction period will extend over 18 months from January of the "start" year to June of the following year.

The initial facility will provide for the 150,000 tonnes per annum operation. The construction plan is based on 5 days per week, 8 hours per day (08:00 to 16:30 with 1/2 hr. lunch break) with no overtime. The labour force on site will be about 12 during January to March increasing to 500 to 600 during months 10 to 16 of the schedule and reducing to zero by the end of month 18. It is expected that the labour force will travel to the site by their own cars, car pools or special buses.

The following activities will occur during the construction period :

- Clear and grub the central plant area.
- Selected removal of site trees.
- Remove or demolish existing buildings.
- Place construction-related office-trailers on site.

Plant construction activities will commence during the summer months, building will be enclosed for continued working over the winter months and all construction works will be completed by the end of June of the following year. System testing and commissioning will commence in July and be completed for handover and startup by the beginning of October.

3.2 PERIMETER WORKS

A 50 m buffer zone will be provided around the site perimeter between the property line and the landfill development. This buffer zone will include a berm/barrier, perimeter drainage ditches, and a perimeter road. The perimeter construction works will commence (at the north side of the site) about April and be completed by approximately the end of December. These works will generally be concurrent with plant construction works. For the purpose of this Report the height of the berm/barrier has been assumed to be 5.0 m above the relative site and receiver elevations.

The following equipment will be involved in the preimeter works (Monenco, 1987):

Equipment	Number of Units	Driveby SPL Rating at 15 m (dBA)
625 Scrapers	2	85
D8 Tractor (With Dozer)	1	85
2 cu. m Backhoe	10	80
4 cu. m Front End Loader	6	85
D6 Tractor (With Dozer)	4	85
Grader	1	83

The M.O.E. assesses construction noise on the basis of limits set for the noise generated by the equipment at source rather than the noise levels at the receiving point. The worst case actual noise impact from perimeter works will be at houses immediately adjacent to the site when the ditches and berm are being constructed. For example, if 3 units of equipment are being operated simultaneously at the northerly property line (i.e. at Highway 20) directly opposite a residence, the residence could receive peak noise levels of approximately 80 to 82 dBA while the units are operating at full power. However, the average hourly Leq over the construction period will be approximately 62 dBA.

Noise generated by site perimeter works has been generally included in the overall construction noise levels used to derive the contours on drawing W85-248-G. However, the contours (and noise levels) do not apply when the perimeter works are directly opposite an adjacent residence and a significant noise impact may be experienced during such periods.

3.3 PLANT CONSTRUCTION

Monenco (1987) sets out data on a monthly basis for all truck traffic (site works, deliveries, etc.) and all heavy equipment to be used on-site (See Table 3). Since the period of greatest site activity is during June to October (of the first year) the noise analysis has been based on this period as a "worst case" condition.

The equipment complement involved in plant construction will be as follows:

Equipment	Number of Units	Noise Level (SPL) at 15 m (dBA)
70 Ton Cranes	4	83
150 Ton Cranes	2	83
22 Cherry Picker	10	83
125 cfm Air Compressors	2	76
100 kva Diesel Generators	2	95
Impact Wrenches	6	
Air Arc Cutters	2	
4 HP Portable Pumps	20	76
Air Pumps	6	76

During the peak construction months the following trucks will be involved on site daily:

Trucks	Number of Units	Noise Level (SPL) at 15 m (dBA) (Driveby)
On site daily:		
- Pick-Ups	25	75
- Clean-Up Trucks	10	85
- 10 cu. m Trucks	30	85
- Water Trucks (trips)	16	85
Deliveries - Misc.	47	85

As previously mentioned the M.O.E. will assess construction noise on the basis of noise level limits which are applied to the equipment at source not on the basis of noise levels at a receiver. However, for OWMC purposes construction noise level contours have been developed (see Section 2.0 Methodology) and are shown on Drawing W85-258-G. The construction noise level contours do not include noise generated by the initial landfill development.

3.4 INITIAL LANDFILL DEVELOPMENT

The initial landfill development will progress simultaneously with the perimeter earthworks and the plant construction. The development will involve the site preparation and excavation for the landfill starting point. The starting landfill location is at the south side of the facility truck entrance off Schram Road. The landfill will be a continuous operation working south, west, north, east and south following the site boundary until the landfill is finally terminated at the north side of the employee parking lot shown on Figure 4 (Reference Monenco, 1987).

The dimensions of the working area for the landfill method are set out in Section 5.0.

The equipment complement involved in the initial development works will be (reference Dillon, 1987) :

Equipment	Number of Units	Driveby SPL Rating at 15 m (dBA)
D8 Tractor (Dozer Attach)	1	85
Gradall	1	85
Large Grader	1	83
D6 Tractor (Dozer Attach)	1	85
245 Backhoe	6	80
Medium Size Compactor	1	79
Miscellaneous Trucks		
- Dump Truck	1	85
- Water Truck	1	85
- Fuel & Maintenance Truck	1	85
- Pick-Up	1	75

The works will be carried out on a work schedule of 8 hours per day (daylight hours), 5 days per week with no overtime.

Since this phase of the landfill operations is part of the construction works the M.O.E. will assess noise impact (as previously stated) on the basis of noise levels at the equipment.

Noise level data for on-going landfill operations is covered in detail in Section 5.0 with noise level contour drawings for landfill operations in each of the corners of the site.

3.5 CONSTRUCTION PERIOD TRAFFIC

Dillon (1987) provided data on the predicted 1990 background traffic volumes on access roads and the construction period surcharge of cars and trucks due to construction activities (see Appendix 2). Data are summarized on Table 11 using a peak month of construction activity with the highest volume of OWMC-generated truck traffic. The data covers the period between 07:00 and 17:20 hours and the Leq noise levels are for this period. Calculated data are set out on Table 12.

The addition of OWMC-generated construction period traffic will not increase traffic noise levels along RR24 from Queen Elizabeth Way to RR73. However RR24 noise levels will be increased by 3 dBA (minimal or no impact) between RR73 and RR216 and by 4 dBA (low impact) between RR216 and Highway 20.

The addition of OWMC-generated construction period traffic will increase traffic noise levels along Highway 20 by 5 dBA (low impact) between RR24 and Schram Road but will not increase noise levels west of Schram Road. Noise levels will be slightly higher near the intersection of Highway 20 and Schram Road due to interrupted traffic flow with vehicles turning into and out of Schram Road. The slightly increased noise levels will occur within 150 m each side of the intersection. Residential receptors are identified by number on Table 13. The only residences affected by the interrupted traffic flow will be 32, 33 and 75. The noise impact rating for these residences will be:

Residence Number	Increase (dBA) Due to OWMC Traffic	Impact Rating
32	Less than 7	Moderate impact
33	Less than 6	Moderate impact
75	Less than 8	Moderate impact

4.0 PLANT OPERATIONS NOISE LEVELS

4.1 GENERAL

Monenco (1987) provided data and location for each of the areas in the waste treatment facility. The areas are set out in 47 categories and the location of each function is identified on the drawings. The 47 areas are identified on Figure 4 and a perspective view is shown on Figure 5.

Distances from each of the areas to the plant perimeter were scaled from the "Site Plan" drawing noted above (i.e. from a 1:10,000 scale copy of the noted drawing).

Monenco (1987) provided data on outdoor plant noise sources for the 150,000 t/a and 300,000 t/a Facility. This Report detailed the stationary and mobile noise sources involved with each plant area giving equipment types, number of units and sound power levels. (The data in reproduced in Table 2 of this Report).

In assessing noise impact from plant operations only outdoor noise sources have been taken into account. It has been assumed that building walls will provide an attenuation of at least 10 to 20 dBA for interior equipment. Therefore, the noise levels generated by indoor equipment to the exterior will not be significant in relation to noise levels generated by the outdoor noise sources.

For the year 5 (150,000 t/a) and year 10 (300,000 t/a) operations mobile equipment (such as trucks, etc.) will operate only during the day shifts 5 days per week. Equipment associated with the operation of the physical/chemical treatment plant will operate 24 hours per day, 5 days per week. Equipment associated with the operation of the incineration plant and general equipment such as ventilation fans will operate 24 hours per day, seven days per week.

The noise level data and the contours shown on Drawing W85-248-A are calculated for a week day operation and levels may be slightly lower on weekends. Since night-time noise levels will not be perceptibly different from daytime noise levels (only the mobile equipment will not be in operation) separate day/night noise data have not been shown on the contour drawings.

The detailed data for equipment types, number of units and sound power levels are summarized on Table 2. Since it is intended that slower speed, larger ventilation fans will be used, the sound power levels shown in Table 2 are somewhat lower than levels usually encountered with ventilation fans in industrial buildings.

In calculating noise levels a +5 dB correction factor has been applied in all cases where the noise sources will have a pronounced tonal quality (as per M.O.E. NPC-104).

4.2 OPERATIONS AT 150,000 AND 300,000 TONNES PER ANNUM (t/a)

As noted in Section 2.0 the assessment of noise impact has been based on ambient noise levels along Highway 20 and a level of Leq 40 dBA along the east, south and west site perimeters. The lowest hourly ambient noise levels (i.e. the levels used for noise impact assessment) along Highway 20 (see Table 1) are Leq 56 dBA daytime (20:00 to 21:00) hours and Leq 47 dBA night-time (03:00 to 04:00 hours).

Drawing W85-248-A sets out the Leq 40 dBA noise level contours for the 150,000 t/a and 300,000 t/a levels of operation. The 300,000 t/a contour extends approximately 110 m farther from the plant than the 150,000 t/a contour. The contours are applicable for either day or night periods.

Data on noise impact is set out in Section 7.0 of this Report.

5.0 ON-GOING LANDFILL OPERATIONS NOISE LEVELS

5.1 GENERAL

The initial site development will take place during the construction period and data has been included in Section 3.0 of this Report.

The treated and solidified waste material will be entombed using a shallow entombed landfill (area) method. The approximate dimensions of the working area will be:

Width of working area	-	250 m
Length of working area	-	230 m
Depth of landfill	-	15 m
Side slopes	-	3:1 (approx)
Depth of solidified mass	-	10 m
Depth of cover system		5 m

A cross section diagram of the landfill is shown on Figure 8 and a working area layout drawing is shown on Figure 6.

Monenco (1987) provided equipment data for each stage of the landfill operation covering:

- Equipment types.
- Number of units required.
- Percentage of time noise source will be above ground level.
- Utilization periods for equipment.

It is assumed that all units of equipment will operate on a relatively continuous basis over an 8 hour day shift 5 x days per week. The noted data is summarized on Table 4 to 7.

5.2 YEAR 5 AND YEAR 10 OPERATIONS

Landfill operations have been assessed on the basis of the year 5 (150,000 tonnes/annum) and the year 10 (300,000 tonnes/annum) operating stages.

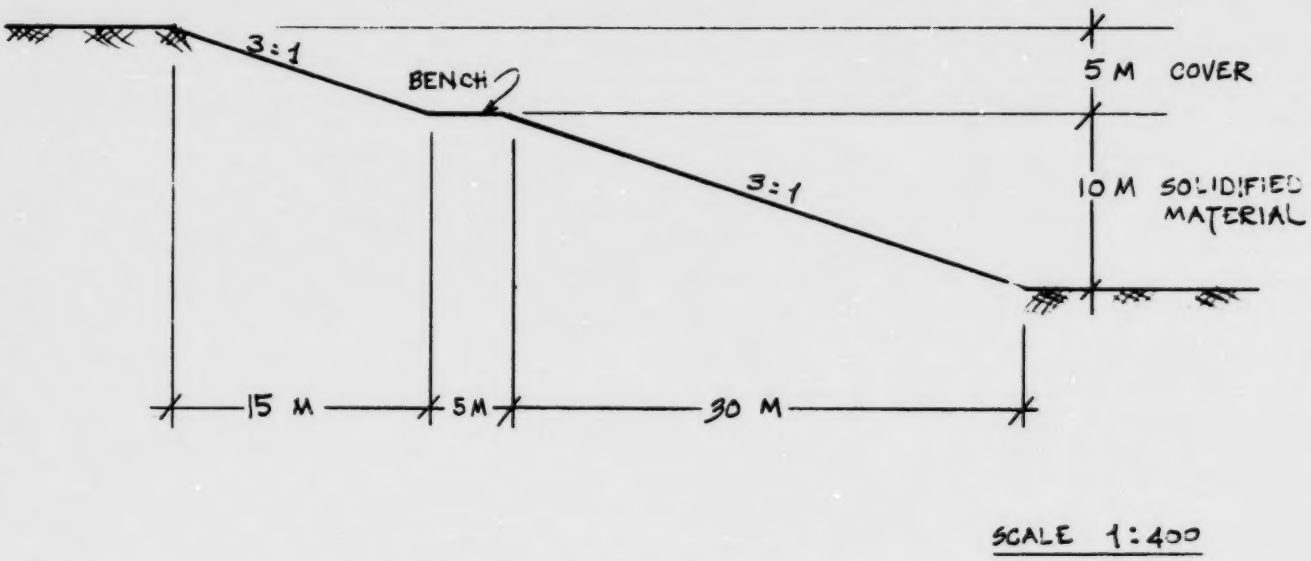


FIGURE 8: CROSS SECTION OF LANDFILL AREA
(3:1 SIDE SLOPES)

The tables, noise impact evaluation and noise level contours included in this Report cover the year 10-300,000 tonnes/annum, typical operation case which can be considered as the probable "worst case" operation. A detailed analysis was carried out for 150,000 t/a - typical operation and high solidified waste modes and for 300,000 t/a - typical operation and high solid waste modes. This detailed analysis is set out in S.S. Wilson and Associates Report W85-248 No.5, June 16, 1987.

The analysis for landfill operations include the excavation, soilidified residual waste and granular material delivery to the fill area and clay removed to the cover or off site. The noise level prediction method and the impact evaluation reference data are set out in Section 2.0.

The equipment complement for the 300,000 t/a, typical operation mode is set out on Table 6.

Landfilling will be carried out as a continuous operation. The starting landfill location will be at the south side of the facility truck entrance off Schram Road. Landfilling will follow the site boundary, moving south from the starting location then west, north, east and south until the landfill is finally terminated at the north side of the employee parking lot as shown on Figure 4. At the 150,000 t/a operations level the landfilling will move at approximately 50 m per year (Reference Monenco, 1987).

In analyzing noise impact from landfill operations it must be borne in mind that the operation is a moving function. Therefore when the landfill is at the north end of the site the noise levels will have low impact at receptors at the south end of the site and vice versa. In view of this four representative landfill noise level contour drawings have been produced setting out contours for working areas at the 4 x quadrants of the site. These drawings set out 65, 60, 55, 50 and 45 dBA noise level contours. The contours are set out on 1:20,000 scale drawing Numbers W85-248 - G, H, I and J which form part of this Report.

The Institute of Environmental Research has identified 96 potentially sensitive locations (residences) in the site vicinity and Ecologistics Limited have identified 70 potentially sensitive locations (barns) in the site vicinity. The locations are summarized in Dillon (1987).

Noise level impact has been calculated for each of these locations for 4 cases of landfill operations, i.e. with the working area at the northwest, northeast, southeast and southwest corners of the site. In each case the impact applies only for the period when the working area is at the particular corner of the site and the impact diminishes as the working area moves further away from the noise sensitive locations.

Tables 13 to 18 summarize the noise levels, impact and mitigation considerations for landfill operations in each of the four site quadrants for the 300,000 tonnes per annum, typical operations stage.

- Table 13 - Leq (dBA) Noise Levels at Residential Locations 1 to 96.

- Table 14 - Summary of Impacted Residences Reference MOE Criteria.

- Table 15 - Summary of Impacted Residences Reference Ambient Criteria.

- Table 16 - Mitigation Measures to be Considered Reference MOE Criteria.

- Table 17 - Mitigation Measures to be Considered Reference Ambient Criteria.

- Table 18 - Leq (dBA) Noise Levels at Barn Locations A to NN.

Noise level impact at sensitive locations is discussed in Section 7.0 of this Report.

6.0 LOCAL AND REGIONAL ACCESS ROAD NOISE LEVELS

6.1 GENERAL DATA

Road traffic data were provided by Dillon (1987) for years 1995 and 2000 with and without OWMC truck traffic. The main access route to the preferred site will be from Queen Elizabeth Way via Regional Road 24 and Highway 20 to Schram Road. The site access for inbound and outbound trucks is located on Schram Road approximately 900 m south of the Highway 20/Schram Road intersection.

The OWMC truck volumes arriving/departing the site and travelling on the local and regional access routes have been summarized on Table 11. Since OWMC-generated truck traffic will not occur during night-time hours the AADT traffic volumes with and without OWMC have been converted to an 07:00 to 17:00 hours AADT for analysis purposes. The conversion data is set out in Section 2.0.

6.2 ROAD NOISE LEVELS

Summarized access road data and road traffic noise levels are set out on Tables 19 and 20 and a sample computer readout is shown on Table 21. Table 19 is for the 150,000 t/a. Typical Operation stage (i.e. 1995) and Table 20 is for the 300,000 t/a Typical Operation stage (i.e. 2000). Table 20 represents the probable "worst case" access road situation.

OWMC-generated traffic will result in less than 2 dBA increase in noise levels at any access road section except for Schram Road between Highway 20 and the site entrance.

The increase in noise levels (due to OWMC) along this section of Schram Road will be approximately 14 dBA in 1995 and 17 dBA in 2000. Since there are no residences along this section of Schram Road (except for those near Highway 20 and impacted by Highway 20 noise) there will be no impact due to the increase noise levels along Schram Road.

Noise levels will be slightly higher near the intersection of Highway 20 and Schram Road due to interrupted traffic flow with vehicles turning into and out of Schram Road. The slightly increased noise levels will affect residential receptors within 150 m of the intersection.

Although the Leq noise levels set out in Table 19 and 20 are for a receiver at 20 m from the roadway centre line, it should be noted that the differences in noise levels (i.e. without and with OWMC) will be the same at any distance from the roadway centre line. Therefore the noise level impact (reference Leq 07:00 to 17:00) at any residence at any distance from Highway 20 will be less than 2 dBA due to the addition of OWMC-generated traffic for either the 150,000 tonnes per annum or 300,000 tonnes per annum operations level except for those residences within 150 m of the intersection of Highway 20 and and Schram Road. Only 3 residences (32, 33 and 75 - see Table 13) will be affected by the interrupted traffic flow at the intersection after taking into consideration the proposed re-alignment of Schram Road to the east just south of highway 20. Noise impact rating can be summarized as follows:

Residence Number	Increase (dBA) Due to OWMC Traffic	Impact Rating
32	Less than 4	Low
33	Less than 3	Marginal or none
75	Less than 5	Low
All others	Less than 2	Marginal or none

The noise level data for interrupted traffic flow covers overall truck percentages (including OWMC-generated truck traffic) up to 22%.

As noted in Section 4.0, on site noise level measurements were made at three locations along RR24 and one along Highway 20 in 1986. A comparison between the measured data and calculated data for 1986 is as follows:

		07:00 to 23:00 Leq (dBA) - 1986	
		Measured	Calculated
A1:	QEW to RR81	68	66
A2:	Moyer to RR73	69	69
A3:	RR216 to Hwy. 20	66	65
B1:	Hwy. 20 - RR24 to Schram	61	62

As can be seen the measured and calculated levels are within 0 to 2 dBA which can be considered to correlate well.

6.3 VIBRATION LEVELS DUE TO TRUCK PASSBY

At the present time the Ministry of the Environment does not have guidelines covering ground borne vibration from truck passby. However along smooth paved road surfaces trucks or cars do not normally generate vibrations in the road surface which are large enough to be perceived at the residences along a roadway. In this case no ground borne vibration impact is predicted from OWMC-generated truck passbys.

High level air borne low frequency sound below 100 Hz can excite vibration in loose building elements (e.g. loose windows). At high levels it is possible for acoustic coupling of sound waves through apertures (such as windows) to excite the window pane and some room contents into vibration. However with the relatively low increase in truck traffic due to OWMC and the low sound levels reaching the residences (from truck passby) no increase in such vibration impact is predicted over what may exist at the present time.

7.0 NOISE IMPACT AT POTENTIALLY SENSITIVE LOCATIONS

7.1 POTENTIALLY SENSITIVE LOCATIONS

As previously noted, the Institute of Environmental Research (1987) has identified 96 potentially sensitive residential locations and Ecologistics Limited (1987) have identified 70 potentially sensitive barn (animal) locations in the site vicinity. These locations numbered 1 to 96 and A to NN respectively are shown on the noise level contour drawings for landfill operations.

7.2 CONSTRUCTION PERIOD

1. The M.O.E. will assess noise impact during the construction period against the noise level standards set out in M.O.E. Publications NPC-115 and NPC-118 (see References and Appendix 1). These standards limit the allowable noise levels from the equipment at source rather than at the receiver.

   In order to meet the requirements the equipment will have to be certified by the manufacturer. If such certification is not available or if the equipment is not new, it will be required that the Acoustical Consultant certify the equipment based on "on-site" measurements under operating conditions.

   The M.O.E. may also require check measurements to be carried out at intervals during the construction period to ensure that the equipment continue to operate within the limits.

2. The construction period noise impact assessment covers the construction of the plant, initial landfill operations (prior to any entombment) and the site perimeter works.

3. It should be realized that although the M.O.E. requirements are met, construction noise levels at some potentially sensitive locations will be greater than the ambient noise level conditions. For example, with reference to plant construction noise during daytime in the "worst case" month, the residences along the north side of Highway 20 adjacent to the site will receive a noise level of approximately Leq 63 dBA versus an ambient (i.e. lowest hour) of Leq 59 dBA and a residence approximately 500 m south of the site could receive a

noise level of 56 dBA versus an ambient of 40 dBA. For reference purposes Drawing W85-248-G sets out the 60, 55 and 50 dBA Leq noise level contours for construction period noise in the "worst case" month.

The "worst case" impact from perimeter works during construction will be for the short period the perimeter works are opposite a residence. For example, a residence at the north side of the site could receive short term levels as high as 80 dBA versus an ambient of Leq 59 dBA when 4 or 5 units of heavy equipment (e.g. dozers, scrapers) are working at the adjacent perimeter. Under similar conditions the residence near the southwest corner of the site could also receive short term levels as high as 80 dBA.

4. Initial landfill development during the construction period could have impacts of 1 dBA higher than those levels detailed in Clause 7.4.of this report.

5. Impacts as noted notwithstanding the M.O.E. will assess allowable levels during construction as those levels generated by the equipment at source.

6. OWMC-generated traffic on the access routes during the construction period will have impacts as follows:

Road Section	Increase in Level Due to OWMC Traffic	Impact Rating
RR 24		
-QEW to RR73	0	No impact
-RR73 to RR216	3	Minimal or no impact
-RR216 to HWY 20	4	Low Impact
Highway 20		
-East of Schram Road	5	Low Impact
-West of Schram Road	0	No Impact
-Near Schram/Hwy 20 intersection :		
Residence 32	7	Moderate Impact
Residence 33	6	Moderate Impact
Residence 75	8	Moderate Impact

Significant impact will occur at only 3 residences 32, 33 and 75 as noted.

7.3 PLANT OPERATIONS

The Ministry of the Environment will assess noise level impact from plant operations against either the existing ambient noise levels or Leq 40 dBA. As can be seen from the plant operations noise level contour drawing W85-248-A, almost all of the potentially sensitive locations (residences or barns) are outside of the Leq 40 dBA contour.

Some residences along Highway 20 will have day and night levels of 41 to 42 dBA for the 150,000 t/a operation and day and night levels of 42 to 44 dBA for the 300,000 t/a operation. However these residences will have an ambient of day 57 dBA and night 48 dBA (from Highway 20 traffic) so there will be minimal or no impact from plant operations (i.e. noise levels from plant operations will be 13 to 15 dBA (day) and 4 to 6 dBA (night) lower than traffic noise levels from Highway 20).

Residences and barns near the south perimeter of the site will have levels, and impacts as follows:

Residence Number		Estimated 1995/2000 Ambient Level dBA	Plant Operations Levels (dBA) 150,000 t/a	Impact	300,000 t/a	Impact
48/U	Day	44	40	0	42	0
	Night	40	40	0	42	2
49	Day	50	45	0	47	0
	Night	40	45	5	47	7
50/V	Day	41	40	0	41	0
	Night	40	40	0	41	1

The affected residences (48, 49, 50) and barns (U,V) are shown by number and letter on drawing W85-248-A. The impact rating will be:

Residence/Barn	Period	150,000 t/a	300,000 t/a
48/U	Day	No Impact	No Impact
	Night	No Impact	Marginal or No Impact
49	Day	No Impact	No Impact
	Night	Low Impact	Moderate Impact
50/V	Day	No Impact	No Impact
	Night	No Impact	No Impact

The only significant impact will be at residence 49 at night.

7.4 LANDFILL OPERATIONS

1. As set out in Section 3.0 the Ministry of the Environment will assess impact from landfill operations against a daytime (07:00 to 19:00 hours) limit of Leq 55 dBA.

2. The noise level contour drawings and the impact evaluation show the Year 2000, 300,000 t/a - Typical Operation mode. This has been assumed to be the probable "worst case" situation.

3. Drawings W85-248-H,I,J and K show noise level contours for landfill operations at each of corners of the site. Tables 13 and 18 detail the predicted noise levels at the potentially sensitive locations in the site vicinity during the time when landfill operations are at one of these four corner areas. Landfill operations move along the site as the entombment area is filled and capped. Therefore the noise level Tables apply only when the operations are at a particular area.

   At the 150,000 t/a level of operations the landfilling will move at approximately 50 m per year. If we assume the operation is moving away from a specific receptor it will take 5 to 6 years for the noise levels (from landfilling) at the receptor to reduce by 5 dBA. Similarly if the landfilling is moving toward a specific receptor the noise levels at the receptor will increase by 5 dBA over a 5 to 6 year period. If it is assumed that landfilling will move at a rate of 100 m per year at the 300,000 t/a level the time period is shortened to 2 1/2 to 3 years.

4. Table 14 sets out impact for each of the four corner operations assessed against the M.O.E. criteria and represent the E.A. impact assessment. Table 15 has been compiled for OWMC reference and shows impact for each of the four corner operations assessed against ambient noise level conditions. In all cases the ambient takes into account noise levels generated by traffic on Highway 20, local roads and the Toronto, Hamilton, Buffalo Railway (where applicable). Locations where all impacts are zero have been omitted from the Tables.

Table 14 is summarized as follows - reference the MOE criteria:

Item	From Landfill Operations Northwest	Northeast	Southwest	Southeast
Total locations exceeding criteria by 4-5 dBA				
- Residences	Ø	1	Ø	1
- Outdoor living area	Ø	Ø	Ø	Ø
Exceeding criteria by 6 to 10 dBA				
- Residences	3	3	Ø	1
- Outdoor living area	2	3	Ø	1
Exceeding criteria by more than 11 dBA				
- Residences	1	1	1	Ø
- Outdoor living area	Ø	Ø	1	Ø

5. The Ministry of the Environment does not have any guidelines for the assessment of noise impact on barns or animals.

6. Initial landfill development has been considered as part of the construction period. However all data has been calculated for this phase of landfill operations. The initial development will occur in the southeast quadrant of the site and noise levels will be 1 dBA higher (during initial development) than those shown on Tables 13, 14, 15 and 16 for ongoing landfill operations in the southeast quadrant. This increase in level is not significant and the impact rating set out above for the southeast quadrant can be applied to the initial development period.

7.5 ACCESS ROUTES

The Ministry of the Environment has indicated that they will assess impact from road traffic on access roads on the following basis:

- If the addition of OWMC related traffic levels at receptors along access roads by 3 dBA or less it will not be considered to constitute a problem.

- If the addition of OWMC related traffic increases noise levels at receptors along the access roads by more than 5 dBA then mitigation should be examined.

As detailed in Section 6.0 of this Report the increase in noise levels along access roads during ongoing operations will be less than 2 dBA for all road sections except for Schram Road from Highway 20 to the site entrance and the Highway 20/Schram Road intersection. Although the increase along the Schram Road section will exceed the criteria for the 150,000 t/a operation and for the 300,000 t/a operation, it is considered that no impact occurs since no potentially sensitive receptors are impacted. The increase in levels near the Highway 20/Schram Road intersection will be less than 5 dBA so there is no requirement for mitigation.

7.6 NOISE CHARACTERISTICS

It should be noted that the type of noise generated by on site operations will be generally "foreign" to noise usually encountered in rural areas. For example, the plant noise will be noticeable as a constant low level background "hum" which may be aurally intrusive in a rural environment.

8.0 SITE AND VICINITY NOISE MONITORING

8.1 ON-SITE MONITORING

Since the intent of the Environmental Protection Act is the protection of the natural environment as defined in the Act, the lack of potential complainants within the site boundaries would mean that environmental noise is not of direct concern due to the lack of "point of reception".

However, on-site monitoring is very useful and is also highly recommended for the following reasons:

- Measurements and routine monitoring at "key" locations within the site boundaries would serve as a base line to detect changes in the plant operation level itself without the effect of external sources (ambient traffic).

- Assists the plant operators in identifying faulty equipment, for example the loss of damage to bearings of fans and motors.

- All mobile equipment could be subject to noise monitoring on-site as they pose the largest potential source of noise annoyance when they operate near noise sensitive properties adjacent to the site boundaries.

- The noise due to truck traffic in and out of the site's access road could also be monitored on-site as a source of environmental noise which could affect nearby points of reception.

A combination of periodic and continuous monitoring could be employed to reduce the cost and to reduce continuous monitoring of all sources.

1. Continuous Monitoring (Permanent Stations): May be employed at one or two key locations within the site.

2. Periodic Monitoring: Would be employed to check on the effectiveness of the noise control devices and mufflers on mobile equipment used permanently on the site such as dozers, compactors, off-highway vehicles, etc. For the mobile equipment, sound emission levels would be measured for the equipment having the largest noise potential by performing passby and operation tests in accordance with the applicable Canadian Standards Association (CSA), and the Society of Automotive Engineers (SAE) and the International Organization for Standardization (ISO) test methods.

Such tests could be performed only twice a year (e.g. April and September).

Periodic monitoring would also be employed at key locations near largest potential sources or concentration of equipment that are likely to be of significance at the property line - typically exhaust fans. Monitoring could also be for a few minutes or several hours depending on the fluctuation of the sound levels (steadiness). The monitoring would be conducted every 6 months.

8.2 OFF-SITE MONITORING

Unfortunately continuous or permanent monitoring of plant noise is much more difficult at off-site locations due to the following facts:

- Sound level instruments cannot differentiate between plant noise and other community noises not associated with the OWMC operation. The sound levels are cumulative.

- Weather conditions are likely to affect the noise from the plant and/or other community noises. For example, high wind conditions could increase the sound levels measured by the microphones. Rain could increase the vehicular traffic (ambient) noise without affecting the plant noise over and above the normal levels.

  If the objective is to determine the significance of increased truck traffic to and from the OWMC site, traffic counts would be a more appropriate choice.

  The only exception to the above would be contiuous monitoring along the west property line since there is no nearby road traffic (however, one must be careful of the noise from farming equipment which can be quite noisy at shorter distances).

It is reommended that semi-annual noise surveys be carried out at the location of key receivers by conducting sound level measurements using qualified individuals who can follow the Ministry of the Environment procedures for separating the noise from the plant and the ambient (due to vehicular traffic). The sound level surveys could take up to one or two days per key location under weather conditions specified by the M.O.E. The key locations can be specified after the plant goes into operation. However it is suggested that residences number 13, 30, 35, 46, 52 and 57 be considered as key locations for noise level reference.

8.3 BASE LINE CONDITIONS

It is recommended that short term noise level measurements be made (on a 24 x hour basis) around the site perimeter and at the key locations to establish reference conditions.

- When the plant goes into operation at 50,000 tonnes/annum.
- When the plant starts operating at 150,000 tonnes/annum.
- When the plant starts operating at 300,000 tonnes/annum.

9.0 POSSIBLE MITIGATION MEASURES

9.1 GENERAL

It is assumed that mitigation measures are not required during the construction period except to check noise levels generated by equipments at source as noted in Section 7.2 of this Report.

Mitigation measures will have to be considered for noise from plant and landfill operations.

9.2 PLANT OPERATIONS

The predicted noise levels indicate that noise mitigation should be considered for a potentially sensitive location to the southwest of the site. Specifically location 49 (see clause 7.3 of this report).

The plant noise levels at the sourtherly side of the site are mainly due to noise sources near the south site perimeter.

- Extraction fans at the maintenance building, incineration plant, organic drum storage and handling building and firewater pumphouse.

- Air-cooled condensers, drum conveyor and spray drier at the incineration plant.

It is not practical to detail "source" mitigation measures for plant equipment at this time. Manufacturers' specifications would have to be available for all noise source equipment and such data will only be available after equipment is selected during final design of the facility. Possible mitigation measures would include design, equipment choice, enclosures, baffling and the like. If mitigation is to be applied at source it should be aimed at reducing the effective PWL of the individual noise sources.

Since the noise impact occurs during night-time hours (daytime impact is zero), it may be practical to mitigate the noise impact at the receptor. Such treatment will probably entail providing central air conditioning and improving the attenuation quality of windows and exterior doors on the sides of the houses which face the noise source. The house would have to be assessed individually to determine whether it is suitable for such treatment.

The residence at location 49 will also be impacted by noise from landfill operations and mitigation measures are detailed in Section 9.3.

9.3 LANDFILL OPERATIONS

The noise levels from landfill operations have been calculated on the basis of the existence of a 5.0 m berm (or combination berm and barrier) in the 50 m buffer area. The removal of this berm would increase noise levels at all receptors by at least 5.0 dBA. Tables 14 and 15 show the impact for each of the four "corner" landfill operations. Landfill operations noise levels have been calculated on the basis that no clay stockpiling will occur on site. If stockpiling was utilized and:

- scrapers were used to deliver the clay to the stockpile at a rate of 21.2 scraper loads per hour
- a grader or dozer was used to level the stockpile
- a loader was used to load trucks
- trucks were used to haul clay to "cover" and to "off site" at a rate of 4 per hour for each service.

Then as a general approximation the noise levels would be increased (i.e. increased over the no stockpile data previously cited in this report) as follows:

Distance (m) From Stockpile	Approx. Noise Level Increase (dBA)
Receptors within 175 m	8
Receptors within 500 to 1000 m	1 to 3
Receptors over 1000 m	Less than 0.5

Although sensitive locations noted are only impacted while the landfill operation is at the specific area indicated, the landfill operation will move slowly and the impact may be felt over a considerable length of time as noted in clause 7.4 of this report.

Since the landfill operations are daytime both indoor and outdoor noise mitigation should be considered. Such mitigation cannot be detailed without an analysis of each individual receptor to determine what treatment may be practical.

Outdoor residential noise mitigation may be achieved by providing a 60 sq. m "outdoor living area" at the sheltered side of the house with the noise levels attenuated by the

use of acoustic fences along exposed sides of the areas. The height requirements for such fences would be determined by the lot elevations and the amount of attenuation required. It is not practical to consider outdoor attenuation for barn (animal) areas.

Indoor residential noise mitigation may be achieved by central air conditioning of the houses and improved window glazing. In cases where 10 or 11 dBA attenuation is required it may be necessary to use triple glazing. However, all houses may not be suitable for such treatment, for example hot air heating ducts and furnace fans may be undersized for air conditioning requirements or composite walls in older houses may not provide suitable attenuation. A detailed study of each impacted residence would be required to determine possible mitigation measures.

All equipment used in landfill operations will be required to meet M.O.E. requirements as set out in bulletins NPC-115 and NPC-118. Because of the nature of the landfill works it is not practical to consider noise mitigation at source other than to ensure the equipment meet the M.O.E. Requirements. Additional noise barriers placed around the active landfill area would interfere with equipment movement and would require continuous dismantling and reconstruction as the landfill moves along the site.

Locations where mitigation measures should be considered reference MOE criteria are set out on Table 16. Locations where mitigation measures should be considered reference ambient criteria are set out on Table 17.

In effect we have applied mitigation measures at source for heavy landfill equipment by specifying a maximum level of 85 dBA at 15 m (as per M.O.E. NPC-115). The 5.0 m berm constitutes a practical approach to noise mitigation in the path.

The practical approach to noise control measures at the receptor is limited to three factors:

- Providing central air conditioning in houses to alleviate the need to open windows for ventilation pruposes thus retaining the sound attenuation obtained under closed window conditions.

- Upgrading the glazing for residential windows by providing heavier glass, double or triple glazing to increase window attenuation.

- Providing sound barriers at residential outdoor living areas to create a reasonably quiet outdoor area.

A summary of noise control measures to be considered at the receivers is set out on Tables 16 and 17. The estimated costs shown are on the basis of a three bedroom, 2,000 sq. ft. (186 sq. m.) house and a sheltered outdoor living area of 60 sq. m. A detailed house by house analysis will be required to determine whether or not it is feasible to apply noise control to a particular residence and outdoor living area.

The estimated costs per residence are on the basis of $10,000.00 for central air conditioning, $4,500.00 to upgrade windows and $4,000.00 for a berm/barrier around an outdoor living area. The berm/barrier is based on a 2.0 m fence on a 1.0 m berm for a total of 3.0 m. This is the highest berm/barrier combination which is practical when structural and visual concerns are considered.

Figures 9 and 10 show typical requirements and alternatives for noise barriers and outdoor living areas.

9.4 Residual Impact after Mitigation

1. The application of central air conditioning and upgrading of windows for impacted residences is designed to bring the indoor noise levels within the MOE criteria under closed window conditions.Under these circumstances all impacts noted in Tables 14 and 15 for increase over the criteria at the "building face" would not be applicable.

   Although the mitigation would not change the the outdoor levels the indoor noise impact rating under closed window conditions would be "no impact".

2. The attenuation achieved by berms and barriers at the outdoor living areas will be approximately 5.0 dBA with the 3 m barrier noted. The impact ratings for outdoor living areas would be changed as follows:

Reference Table 14 - MOE Criteria (OLA)

- Residence 49 would become 6 Moderate from 11 High for the SE quadrant.

- All others would become minimal or no impact.

FIGURE 9 TYPICAL NOISE BARRIER REQUIREMENTS TO PROTECT DESIGNATED O.L.A.

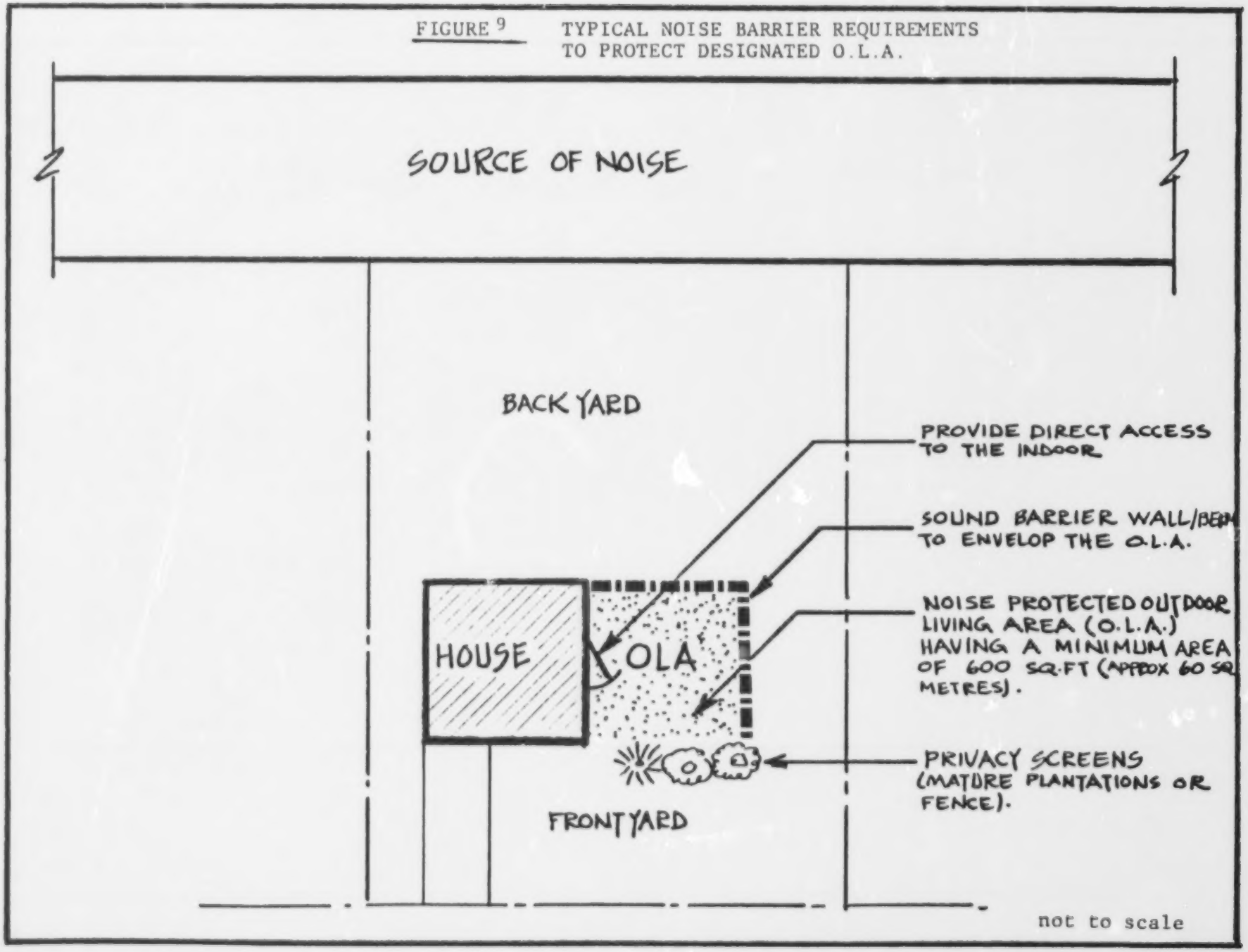
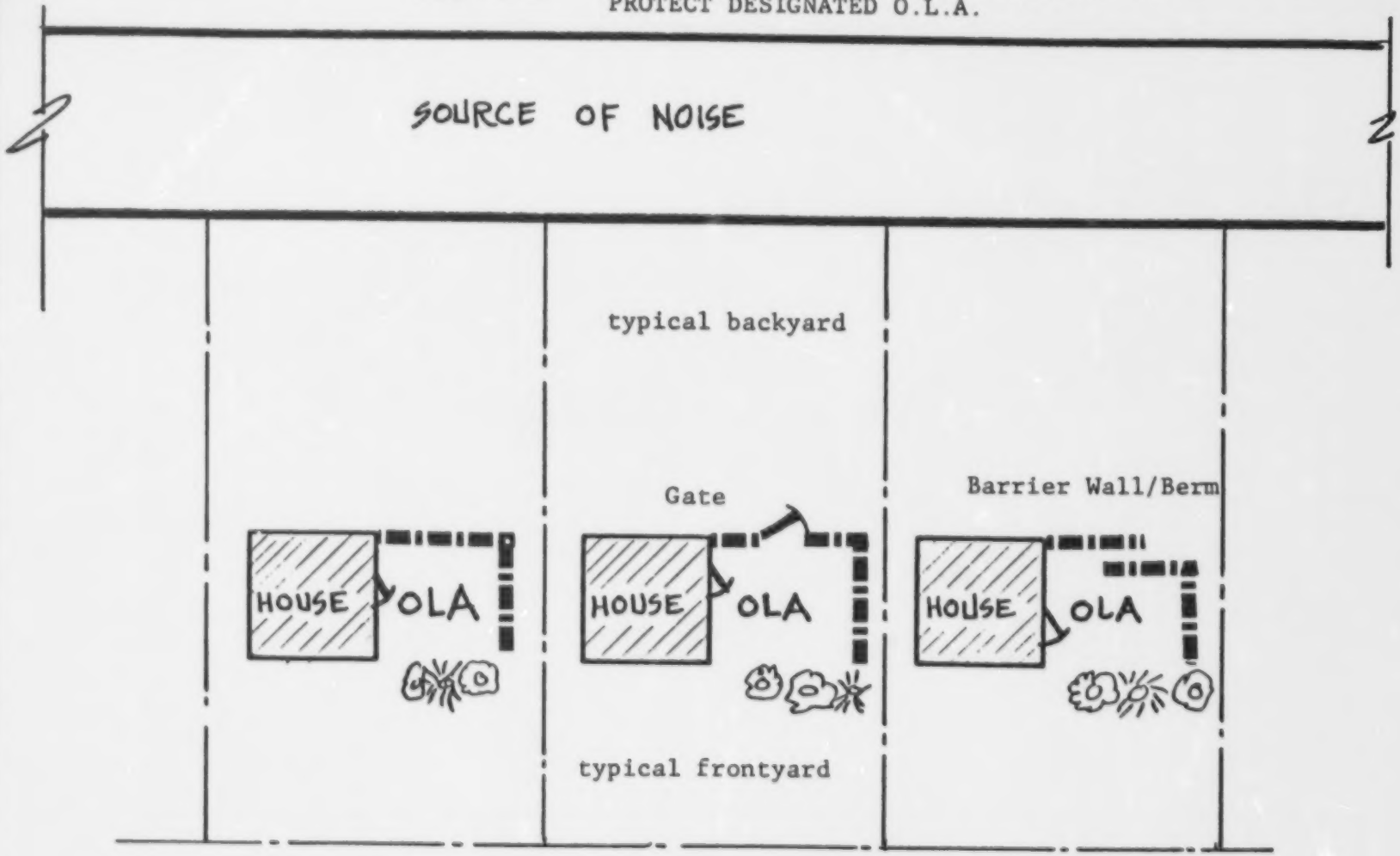

SOURCE OF NOISE
BACK YARD
PROVIDE DIRECT ACCESS TO THE INDOOR
SOUND BARRIER WALL/BERM TO ENVELOP THE O.L.A.
NOISE PROTECTED OUTDOOR LIVING AREA (O.L.A.) HAVING A MINIMUM AREA OF 600 SQ.FT (APPROX 60 SQ METRES).
HOUSE
OLA
PRIVACY SCREENS (MATURE PLANTATIONS OR FENCE).
FRONT YARD
not to scale

FIGURE 10 TYPICAL NOISE BARRIER ALTERNATIVES TO PROTECT DESIGNATED O.L.A.



(a) Barrier without openings (b) Barrier with gate (c) Overlapping barriers

Not to scale

Reference Table 15 - Ambient Criteria (OLA)

NW Quadrant

- Residences 6, 8 to 15, 20, 21, 22, 26, 27, 29, 48, 49, 50, 52, 75 & 90 would become minimal or no impact.
- Residences 16, 17 & 33 would change from moderate to low impact.
- Residences 18 & 19 levels would be reduced by 5 dBA but the impact rating would remain as high (i.e. 11 and 12 dBA).

NE Quadrant

- Residences 19, 26 to 30, 32, 35, 36, 39, 48, 49, 50 and 52 would become minimal or no impact.
- Residences 20 & 34 would change from moderate to low impact.
- Residences 21 & 75 would change from high to moderate impact.
- Residence 33 level would be reduced by 5 dBA (from 16 to 11) but the impact rating would remain as high.

SE Quadrant

- Residences 53, 56, 58, 59 & 60 would become minimal or no impact.
- Residences 48, 51, 52 & 57 would change from high to moderate impact.
- Residences 49 & 50 would be reduced by 5 dBA but the rating would remain high. Since residence 49 would still have a 21 dBA (i.e. 26-5) increase over the ambient the benefit received from a noise barrier would not be significant.

SW Quadrant

- Residences 52, 53, 56, 58, 59 & 90 would become minimal or no impact.
- Residences 50, 51 & 57 would change from high to moderate impact.
- Residences 48 & 49 would reduce by 5 dBA but the rating would remain high. Since these residences would still have very high increases over the ambient the benefit received from a noise barrier would not be significant.

10.0 REFERENCES

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EPA (1971) : Noise from Construction Equipment and Operations, U.S. Environmental Protection Agency, PB-206-7717, Dec. 1971

Ecologistic (1987) : OWMC Site Assessment, Phase 4B: Agriculture. Ecologistic Ltd.

IRE (1987) : OWMC Site Assessment, Phase 4B: Social Impact Institute of Environmental Research.

MOE (1978) : Model Municipal Noise Control By-Law, Final Report, Aug. 1978, Ministry of the Environment.

- Publication NPC-100, "Instrumentation"
- Publication NPC-103, "Procedures"
- Publication NPC-104, "Sound Level Adjustments".
- Publication NPC-105, "Stationary Sources".
- Publication NPC-115, "Construction Equipment".
- Publication NPC-118, "Motorized Conveyances".
- Publication MPC-131, "Guidelines for Noise Control in Land Use Planning".
- Publication NPC-132, "Guidelines for Noise Control in Rural Areas".
- Publication NPC-133, "Guidelines on Information Required for the Assessment of Planned Stationary Sources of Sound".

MOE (1980) : Guidelines for Landfill Sites in Rural Areas, Ministry of the Environment, letter dated January 21, 1980.

Monenco (1987): OWMC Facilities Characteristics (Draft Report) Monenco Ltd.

APPENDIX

- M.O.E. PUBLICATION NPC-115
- M.O.E. PUBLICATION NPC-118

Publication NPC-115

Construction Equipment

1. Scope

This Publication sets sound emission standards for various items of new construction equipment according to the date of manufacture of the equipment.

2. Technical Definitions

The technical terms used in this Publication are defined in Publication NPC-101 - Technical Definitions.

3. Sound Emission Standards

Tables 115-1 to 115-4 inclusive list Residential Area sound emission standards and Quiet Zone sound emission standards for specific items of new construction equipment measured in accordance with the procedures indicated.

TABLE 115-1

Quiet Zone and Residential Area Sound Emission Standards for Excavation Equipment, Dozers, Loaders, Backhoes or Other Equipment Capable of Being Used for Similar Application

Maximum Sound Level as determined using Publication NPC-103 - Procedures, section 6 dBA		
Date of Manufacture	Power Rating Less than 75 kW	Power Rating 75 kW and larger
January 1, 1979 to December 31, 1980	85	88
January 1, 1981 and after	83	85

TABLE 115-2

Sound Emission Standards for Pneumatic Pavement Breakers

Standard	Date of Manufacture	Maximum Sound Level as measured using Publication NPC-103 - Procedures, section 7 dBA
Quiet Zone Sound Emission Standard	Jan. 1, 1979 and after	85
Residential Area Sound Emission Standard	Jan. 1, 1979 to Dec. 31 1980	90
	Jan. 1, 1981 and after	85

TABLE 115-3

Sound Emission Standards for Portable Air Compressors

Standard	Date of Manufacture	Maximum Sound Level as measured using Publication NPC-103 - Procedures, section 7 dBA
Quiet Zone Sound Emission Standard	Jan. 1, 1979 to Dec. 31, 1980	76
	Jan. 1, 1981 and after	70
Residential Area Sound Emission Standard	Jan. 1, 1979 and after	76

TABLE 115-4

Sound Emission Standard for Tracked Drills

Standard	Date of Manufacture	Maximum Sound Level as measured using Publication NPC-103 - Procedures, section 6. dBA
Quiet Zone and Residential Area Sound Emission Standard	Jan. 1, 1981 and after	100

Publication NPC-118

Motorized Conveyances

1. Scope

This Publication sets sound emission standards for motorized conveyances of various types.

2. Technical Definitions

(1) The technical terms used in this Publication are defined in Publication NPC-101 - Technical Definitions.

(2) Definitions Specific to this Publication

Heavy Vehicle

"Heavy vehicle" means a motorized conveyance having a registered gross weight of more than 4,500 kg.

3. Sound Emission Standards - Governed Diesel Engines

Table 118-1 lists for various years of manufacture, the sound emission standard for a heavy vehicle powered by a governed diesel engine when measured in accordance with the procedure set out in the Table.

TABLE 118-1
Sound Emission Standards for Heavy Vehicles
with Governed Diesel Engines

Date of Manufacture	Maximum Sound Level as Measured Using Publication NPC-103 - Procedures, section 9
Prior to Jan. 1, 1979	100
Jan. 1, 1979 and after	95

4. Sound Emission Standards - Gasoline Engines

Table 118-2 lists for various years of manufacture, the sound emission standard for a heavy vehicle powered by an ungoverned gasoline engine, when measured in accordance with the procedure set out in the Table.

TABLE 118-2

UNDER PREPARATION

TABLES

TABLE 1

PREFERRED SITE
Leq (1 Hr.) dBA ON SITE MEASUREMENTS
(Measured January 11 to 13, 1986)

PERIOD	ON SITE LOCATIONS (SEE FIGURE 2) 1	2	3	4
07:00 TO 08:00	63	53	56	44
08:00 TO 09:00	63	52	53	42
09:00 TO 10:00	59	50	48	37
10:00 TO 11:00	58	45	50	37
11:00 to 12:00	60	45	47	39
12:00 to 13:00	61	46	46	39
13:00 to 14:00	62	47	48	40
14:00 to 15:00	60	46	47	40
15:00 to 16:00	61	49	47	40
16:00 to 17:00	63	50	50	42
17:00 to 18:00	64	50	51	43
18:00 to 19:00	64	51	52	43
19:00 to 20:00	59	47	48	40
20:00 to 21:00	56	46	45	38
21:00 to 22:00	57	45	45	37
22:00 to 23:00	56	45	48	38
Overall 07:00 to 23:00	61	49	50	41
23:00 to 24:00	56	44	43	39
00:00 to 01:00	53	37	43	39
01:00 to 02:00	51	39	40	37
02:00 to 03:00	48	39	38	35
03:00 to 04:00	47	37	37	35
04:00 to 05:00	47	40	37	35
05:00 to 06:00	53	43	40	36
06:00 to 07:00	59	47	44	41
Overall 23:00 to 07:00	54	42	41	37

TABLE 2

PLANT NOISE SOURCES (OUTDOOR)

Reference: Monenco (1987)

Area & Equipment Description	No. Normally 150,000 t/a	Operating 300,000 t/a	PWL dBA
1. Administration Building			
- Small exhaust fans on roof	9	9	82
2. Maintenance Building			
- Medium extraction fans on roof	7	7	85
- Small extraction fans on roof	6	6	82
3. Gatehouse & Weigh Scales			
- Small exhaust fan on roof	1	1	82
- Package air conditioner	1	1	90
4. Solidification Plant			
- Medium extraction fans on roof	4	6 (Summer)	85
- Unloading bays (doors open)	-	-	75
- Waste truck deliveries	5-7/day	10-14/day	
- Reagent truck deliveries	3/day	6/day	
5. Physical/Chemical Treatment Plant			
- Medium extraction fans on roof	10	13(Summer)	85
- Small fans	10	10	60
- Reagent truck deliveries	2/day	4/day	
- Evaporator Cooler Fan	1	2	90
6. Physical/Chemical Storage Tank Area			
- Medium extraction fans on roof	4	6 (Summer)	85
7. Inorganic Drum Storage and Handling Building			
- Waste truck delivery	1-3/day	2-6/day	
- Fork Lift Truck (Electric)	1	1	
- Dumpster Hauler	1	1	
- Medium extraction fans on roof	3	6 (Summer)	85
8. Inorganic Tank Truck Unloading Area			
- Waste truck delivery	21-32/day	42-64/day	
- Extraction fans on roof	9	13(Intermittent)	60

TABLE 2 (Cont'd)

PLANT NOISE SOURCES (OUTDOOR)

Area & Equipment Description	No. Normally Operating 150,000 t/a	300,000 t/a	PWL dBA
9. Incineration Plant			
- Medium extraction fans on roof	6	10	70
- Small fans on roof	4	6	60
- Air cooled condensers (front wall)	1	2(Apr-Sept)	90
- Air cooled condensers (Dump Steam)	2	4	90
- Relief valves (with silencers), upset conditions	8 Max.	10 Max.	60
- Waste truck delivery	1-2/day	2-4/day	
- Unloading bays			70
- Ash/Salt, Slag & Product Discharge Conveyor	3	6	85
- Reagent trucks	2/day	4/day	
- Dumpster trucks	4-8/day	8-16/day	
- Spray drier (Rotary atomizer and breaker)	1	2	85
10. Organic Drum Storage and Handling Building			
- Waste truck delivery	2-6/day	4-12/day	
- Fork lift truck (electric)	1	1	
- Dumpster hauler	1	1	
- Medium extraction fans on roof	3	5	85
- Large extraction fans (emergency only)	3	5	90
11. Incinerator Tank Farm			
- Outside pumps	10-15	13-20	91
- Agitators	7	8	82
12. Organic Tank Truck Unloading Area	5-9/day	10-18/day	
13. Incinerator Waste Receiving Tanks			
- Outside pumps	2	2	94
- Agitators	2	2	82
14. Segregated Organic Storage Tank Area			
- Waste truck delivery	1	1	
- Outdoor pumps	2	2	94
- Agitators	3	4	82

TABLE 2 (Cont'd)

PLANT NOISE SOURCES (OUTDOOR)

Area & Equipment Description	No. Nory Operating 150,000 t/a	300,000 t/a	PWL dBA
15. Storage Building			
- Waste truck delivery	Occasional	Occasional	
- Medium extraction fans on roof	4	4	60
16. Main Substation			
- Transformers	2	2	85
17. Emergency Power Station			
- Small exhaust fans on roof	1	1	60
- Medium fans (Upset Condition)	2	2	90
18. Surface Water Pumphouse			
- Small extraction fan	1	1	60
19. Sanitary Sewage Plant			
- Small extraction fan	1	1	60
20. Raw Water Treatment Plant			
- Small extraction fans	2	2	60
21. Firewater Pumphouse			
- Small extraction fan	1	1	60
- Small extraction fan (Intermittent)	1	1	85
22, 23, 24 Ponds	0	0	0
25. Solidified Material Interim Storage Building			
- Front end loader	1	1-2	
- Transport trucks	2	2	
- Small ventilation fans	2	2	70
26. Solidified Material Conveyor	1	1	85
27. Drum Conveyor (enclosed in gallery)	1	1	0
28. Incinerator Stack (at top)	1	1	63
29. Auxiliary Boiler Stack (at top)	1	1	63
30. Evaporator Stack (at top)	1	1	63

TABLE 2 (Cont'd)

PLANT NOISE SOURCES (OUTDOOR)

Area & Equipment Description	No. Normally Operating 150,000 t/a	300,000 t/a	PWL dBA
31. Piperack	1	1	0
32. Waste Truck Holding Area)	)	)	
) Organic	)	)	
33. Waste Truck Holding Area)	)	)	
	) 40-44/day	) 80-88/day	Total
34. Waste Truck Holding Area)	)	)	
) Inorganic	)	)	
35. Waste Truck Holding Area)	)	)	
36. Car Park (staff vehicles)	284/day	374/day	
37. Emergency Corridor	1	1	0
38. Landfill Storm Detention Pond	1	1	0
39. Meteorological/Air Monitoring Station.	1	1	0
40, 41 Evaporator Ponds	1	1	0
42. Truck Loadout Station			
- Loadout equipment	1	1	85
- Small ventilation fans	2	2	70
43. Truck Wash Station			
- Medium extraction fan	1	1	70
44. Truck Wash Station (future)			
- Medium extraction fan	0	1	70
45. Evaporator/Recycle Pump House			
- Small extraction fan	1	1	60
46. Fuel Oil Storage Tanks			
- Outside pump	1	2	94
47. Effluent Storage Tanks			
-Outdoor pumps	1	1	94

DESCRIPTION	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ON-SITE TRANSPORTATION																																									
CENTRAL OPERATING AREA																																									
— 5,000 TRUCKLOADS OF 50,000 m³ TOPSOIL REMOVAL									1250	1250	1250	1250																													
— 6,000 TRUCKLOADS OF 60,000 m³ POND EXCAVATION									650	650	680	680	680	680	680	650	650																								
— 6,000 TRUCKLOADS OF 60,000 m³ BUILDING FOUNDATION EXCAVATION										850	1075	1075	1075	1075	850																										
DELIVERIES																																									
— 5,000 TRUCKLOADS * OF 50,000 m³ GRANULAR MATERIAL FOR ROAD BASE									1600	1700	1700	1700									1650	1650																			
— 1800 TRUCKLOADS * OF 36,000 m³ ASPHALT																					1200	1200	1200																		
— 110 TRUCKLOADS * OF 34,000 m PIPE									15	15	15	15	15	25	25	25	25	25	25																						
— 250 TRUCKLOADS * OF 4000 TONS STRUCTURAL STEEL											60	120	120	120	80																										
— 200 TRUCKLOADS * OF MAJOR EQUIPMENT													60	75	75	75	65	50																							
— 550 TRUCKLOADS * OF 14000 m³ CONCRETE										150	200	200	200	200	150																										
— 100 TRUCKLOADS * OF MISCELLANEOUS ITEMS						10	10	10	10	10	15	15	15	15	15	15	15	15	10	10	5	5																			
CONTINUOUS MOVEMENT																																									
— 4150 TRUCKLOADS OF WATER TO BE SPRAYED ON ROADS FOR DUST CONTROL (2 TRIPS/HR x 8 HRS/DAY x 5 DAYS/WK x 4.33 WKS/MO x 12 MONTHS)									340	350	360	360	350	360	350	360	340				350	350	320																		
INTERMITTENT MOVEMENT																																									
INTERNAL DAILY — 70 TON CRANE x 4						10	10	10	65	65	65	80	80	80	80	80	80	50	50	50	50	50	50	20	20	20															
INTERNAL DAILY — 150 TON CRANE x 2																																									
INTERNAL DAILY — 22 TON CHERRY PICKER x10																																									
INTERNAL DAILY — 10 m³ TRUCKS x 30																																									
INTERNAL DAILY — PICKUP TRUCKS x 25																																									
INTERNAL DAILY — CLEAN UP TRUCKS x 10																																									
SITE PERIMETER DAILY — 625 SCRAPER x 2																																									
SITE PERIMETER DAILY — D8 SCRAPER									24	24	24	24	24	24	24	24	24																								
SITE PERIMETER DAILY — 2 m³ BACK HOE x 10																																									
SITE PERIMETER DAILY — 4 m³ FRONT END LOADER x6																																									
SITE PERIMETER DAILY — D6 BULLDOZER x 4																																									
SITE PERIMETER DAILY — GRADER																																									
WORKFORCE	43	43	43	476	476	563	3295	5213	6543	10842	13540	15887	22750	21065	25283	23460	26227	24179	23049	13427	5650	87	87	87	43																

TRUCKLOAD / VEHICLE MOVEMENTS PER MONTH

NOTES:

1. TRUCKLOAD QUANTITIES NOTED BY * ABOVE HAVE BEEN MULTIPLIED BY 2 ON DURATION LINE TO SHOW RETURNING EMPTY.
2. EARTH MOVEMENT TRUCKLOAD SIZE ASSUMED TO BE 10 CUBIC METRES (m³).
3. ASSUME 100% WORKFORCE DRIVE OWN VEHICLE TO AND FROM SITE. (# MEN) x 2 x 5 DAYS/WK x 4.33 WKS/MONTH)
4. INTERMITTENT MOVEMENT VEHICLES ARE PRESENT BUT NOT MOVING ON A CONTINUOUS BASIS.

MONENCO LIMITED

GRAC TREATMENT FACILITY CONSTRUCTION TRANSPORTATION ON-SITES 130.0094a

TABLE 3: CONSTRUCTION PERIOD-SITE EQUIPMENT USAGE.
(Monenco Limited Phase 4B Report, Figure 5.8)

TABLE 4

LANDFILL EQUIPMENT COMPLEMENT
TYPICAL OPERATION
150000 t/a - YEAR 5

EQUIPMENT	QUANTITY	% UTILIZATION	% TIME ABOVE GRADE
D8 TRACTOR (WITH DOZER)	1	40	80-100
D6 TRACTOR (WITH DOZER)	1	40	50
245 BACKHOE	3	55	50
TRACKED OR RUBBER TIRED LOADER	1	40	80-100
LARGE COMPACTOR	1	40	80-100
MEDIUM COMPACTOR	1	40	50
DUMP TRUCK (FOR SOLIDIFIED MATERIAL)	2	65	80-100
MISCELLANEOUS TRUCKS			
- WATER TRUCK	1	40	80-100
- FUEL & MAINTENANCE TRUCK	1	40	80-100
- PICK UP TRUCK	1	40	80-100
LARGE GRADER	1	40	80-100

Reference: Monenco (1987)

TABLE 5

LANDFILL EQUIPMENT COMPLEMENT
HIGH SOLIDIFIED WASTE MODE
150000 t/a - YEAR 5

EQUIPMENT	QUANTITY	% UTILIZATION	% TIME ABOVE GRADE
D8 TRACTOR (WITH DOZER)	1	65	80-100
D6 TRACTOR (WITH DOZER)	1	65	50
245 BACKHOE	4	60	50
TRACKED OR RUBBER TIRED LOADER	1	65	80-100
LARGE COMPACTOR	1	65	80-100
MEDIUM COMPACTOR	1	65	50
DUMP TRUCK (FOR SOLIDIFIED MATERIAL)	3	70	80-100
MISCELLANEOUS TRUCKS			
- WATER TRUCK	1	65	80-100
- FUEL & MAINTENANCE TRUCK	1	65	80-100
- PICK UP TRUCK	1	65	80-100
LARGE GRADER	1	65	80-100

Reference: Monenco (1987)

TABLE 6

LANDFILL EQUIPMENT COMPLEMENT
TYPICAL OPERATION
300000 t/a - YEAR 10

EQUIPMENT	QUANTITY	% UTILIZATION	% TIME ABOVE GRADE
D8 TRACTOR (WITH DOZER)	1	80	80-100
D6 TRACTOR (WITH DOZER)	1	80	50
245 BACKHOE	4	70	50
TRACKED OR RUBBER TIRED LOADER	1	80	80-100
LARGE COMPACTOR	1	80	80-100
MEDIUM COMPACTOR	1	80	50
DUMP TRUCK (FOR SOLIDFIED MATERIAL)	3	85	80-100
MISCELLANEOUS TRUCKS			
- WATER TRUCK	1	80	80-100
- FUEL & MAINTENANCE TRUCK	1	80	80-100
- PICK UP TRUCK	1	80	80-100
LARGE GRADER	1	80	80-100

Reference: Monenco (1987)

TABLE 7

LANDFILL EQUIPMENT COMPLEMENT
HIGH SOLIDIFIED WASTE MODE
300000 t/a - YEAR 10

EQUIPMENT	QUANTITY	% UTILIZATION	% TIME ABOVE GRADE
D8 TRACTOR (WITH DOZER)	2	65	80-100
D6 TRACTOR (WITH DOZER)	2	65	50
245 BACKHOE	6	70	50
TRACKED OR RUBBER TIRED LOADER	2	65	80-100
LARGE COMPACTOR	2	65	80-100
MEDIUM COMPACTOR	2	65	50
DUMP TRUCK (FOR SOLIDIFIED MATERIAL)	5	85	80-100
MISCELLANEOUS TRUCKS			
- WATER TRUCK	2	65	80-100
- FUEL & MAINTENANCE TRUCK	2	65	80-100
- PICK UP TRUCK	2	65	80-100
LARGE GRADER	2	65	80-100

Reference: Monenco (1987)

TABLE 8

LANDFILL EQUIPMENT - REFERENCE NOISE LEVELS

EQUIPMENT TYPE	SPL RATING dBA AT 15 m.	
	DRIVEBY	IDLING
D8 TRACTOR (WITH DOZER)	85	80
D6 TRACTOR (WITH DOZER)	85	80
LARGE GRADER	83	83
245 BACKHOE	80	80
TRACKED OR TIRED LOADER	85	75
LARGE COMPACTOR	83	85
MEDIUM COMPACTOR	79	77
DUMP TRUCKS	85	82

SPL Ratings are Caterpillar ratings (as provided by Monenco Limited) up to a maximum level of 85 dBA, which is the upper limit established by the Ministry of the Environment Publication NPC-115, "Construction Equipment".

Sound attenuation coefficient in dB/100 m for 1/3 octave band analysis

Band centre frequency	Relative humidity = 50 %										
	Temperature, °C										
Hz	− 10	− 5	0	5	10	15	20	25	30	35	40
50	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
63	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
80	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1
100	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,1
125	0,1	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1
160	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
200	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,2
250	0,2	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,2	0,2
315	0,3	0,2	0,1	0,1	0,1	0,1	0,2	0,2	0,2	0,2	0,2
400	0,4	0,3	0,2	0,2	0,2	0,2	0,2	0,2	0,3	0,3	0,3
500	0,5	0,4	0,3	0,2	0,2	0,2	0,3	0,3	0,3	0,3	0,4
630	0,7	0,6	0,4	0,3	0,3	0,3	0,3	0,4	0,4	0,4	0,5
800	1,0	0,8	0,6	0,5	0,4	0,4	0,4	0,5	0,5	0,6	0,6
1 000	1,4	1,1	0,9	0,6	0,5	0,5	0,5	0,6	0,6	0,7	0,8
1 250	1,8	1,6	1,2	0,9	0,7	0,6	0,7	0,7	0,8	0,9	1,0
1 600	2,3	2,2	1,8	1,3	1,0	0,9	0,9	0,9	1,0	1,1	1,3
2 000	2,8	3,1	2,4	1,9	1,5	1,2	1,1	1,2	1,3	1,4	1,6
2 500	3,4	4,0	3,4	2,7	2,1	1,6	1,5	1,5	1,7	1,8	2,0
3 150	4,0	5,1	4,7	3,8	3,0	2,3	2,0	1,9	2,1	2,3	2,5
4 000	4,6	6,4	6,7	5,5	4,4	3,4	2,8	2,6	2,7	3,0	3,3
5 000	4,9	7,2	7,9	6,5	5,2	4,2	3,4	3,1	3,1	3,4	3,7
6 300	5,4	8,6	10,2	8,9	7,3	5,9	4,7	4,1	4,0	4,3	4,7
8 000	6,2	10,2	13,1	12,5	10,5	8,6	6,9	5,8	5,4	5,7	6,2
10 000	7,2	11,9	16,4	17,8	15,0	12,4	10,2	8,4	7,5	7,4	8,1
12 500	8,4	13,6	20,1	23,4	20,6	17,5	14,4	11,9	10,4	9,9	10,5

TABLE 9: INTERNATIONAL STANDARDS ORGANIZATION ATMOSPHERIC ATTENUATION DATA.

TABLE 10

ACCESS ROAD TRAFFIC WITHOUT OWMC.

Predicted Baseline Conditions on Preferred Access Route

For 1990, 1995 and 2000

LINK DESCRIPTION	1990				1995				2000		
	AADT[1]	DHV[2]	% HEAVY & MEDIUM TRUCKS		AADT	DHV	% HEAVY & MEDIUM TRUCKS	Speed km/hr	AADT	DHV	% HEAVY & MEDIUM TRUCKS
A. Vineland Townline Road (R.R.#24)											
1. QEW to R.R.#81	9 930	1 095	19		12 100	1 340	19	60	14 830	1 630	19
2. R.R.#81 to Hoyer	9 160	1 100	22		11 750	1 410	22	60	15 070	1 810	22
3. Hoyer to R.R.#73	9 160	1 100	22		11 750	1 410	22	70	15 070	1 810	22
4. R.R.#73 to Ninth Ave.	7 130	860	22		8 710	1 050	22	80	10 650	1 280	22
5. Ninth Ave. to R.R.#216	6 710	740	22		7 740	850	22	80	8 920	980	22
6. R.R.#216 to Hwy. 20	5 590	615	22		6 450	710	22	80	7 450	820	22
B. Highway 20											
1. R.R.#24 to Schram Rd.	3 500	380	16		3 610	390	16	80	3 720	400	16
C. Schram Road											
1. Hwy 20 to site	130	15	3		150	15	3	80	160	15	3

[1] Annual average daily traffic
[2] Design hour volume

Reference: M.M. Dillon Limited Report Phase 4B: Site Assessment Transportation

Table 11- OWMC Truck Traffic on Access Roads.

OWMC PHASE 4B - TRANSPORTATION
TWO-WAY DAILY OWMC GENERATED TRAFFIC VOLUMES ASSIGNED TO THE LOCAL AND REGIONAL ACCESS ROUTE FOR YEAR 1990: SITE CONSTRUCTION (PEAK MONTH)

Access Route Link Description	WORK DAY TWO-WAY TRAFFIC VOLUMES				
	Medium and Heavy Trucks				
	Clay Exports	Material and Equipment	Total	Passenger Vehicles	Total All Vehicles
A. Vineland Townline Road (RR#24)					
1. QEW to RR#81	0	2	2	198	200
2. RR#81 to Moyer	0	2	2	198	200
3. Moyer to RR#73	0	2	2	198	200
4. RR#73 to Ninth Ave.	954	2	956	198	1 154
5. Ninth Ave. to RR#216	954	2	956	198	1 154
6. RR#216 to Hwy 20	954	2	956	198	1 154
B. Highway 20					
1. RR#24 to Schram Rd.	954	16	970	542	1 512
2. Schram Rd[1] to Bismarck	0	6	6	444	450
C. Schram Road					
1. Hwy 20 to site	954	22	976	986	1 962

NOTES: 1. Access road link B.2. is not a part of the defined local and regional access route; however volume assignment to this link is displayed in that this traffic surcharge is an input to the site noise impact assessment and design of the Highway 20/Schram Road intersection.

Reference:Dillon (1987)

Table 11 (Con't)

OWMC PHASE 4B - TRANSPORTATION
TWO-WAY DAILY OWMC GENERATED TRAFFIC VOLUMES ASSIGNED
TO THE LOCAL AND REGIONAL ACCESS ROUTE
FOR YEAR 1995: OPERATING LEVEL 150 000 t/a

Access Route Link Description	OPERATING WEEKDAY TWO-WAY TRAFFIC VOLUMES					
	MEDIUM AND HEAVY TRUCKS CARRYING[1]					
	Special Waste	Additives & Reagents	Sub Total	Clay and Granular	Total Trucks	Employee Vehicles[2]
A. Vineland Town-line Road (RR#24)						
1. QEW to RR#81	54	10	64	0	64	0
2. RR#81 to Moyer	54	10	64	0	64	0
3. Moyer to RR#73	54	10	64	0	64	0
4. RR#73 to Ninth Ave.	54	10	64	78	142	0
5. Ninth Ave. to RR#216	54	10	64	78	142	0
6. RR#216 to Hwy 20	54	10	64	78	142	0
B. Highway 20						
1. RR#24 to Schram Rd.	80	10	90	78	168	200
2. Schram Rd. to Bismarck[3]	0	0	0	0	0	164
C. Schram Road						
1. Hwy 20 to site	80	10	90	78	168	364

NOTES:
1. The medium and heavy truck operating weekday volumes displayed are rounded values calculated by dividing the total annual volume by 250 working days during which these movements would occur (clay movements based on 210 working days year).
2. Employee trips are based on normal workdays when maximum employment occurs and is concurrent with material movements.
3. Access road link B.2. is not a part of the defined local and regional access route; however volume assignment to this link is displayed in that this traffic surcharge is an input to the site noise impact assessment and design of the Highway 20/ Schram Road intersection.

Table 11 (Cont'd)

OWMC PHASE 4A - TRANSPORTATION
TWO-WAY DAILY OWMC GENERATED TRAFFIC VOLUMES ASSIGNED TO THE LOCAL AND REGIONAL ACCESS ROUTE FOR YEAR 2000: OPERATING LEVEL 300 000 t/a

ACCESS ROUTE LINK DESCRIPTION	OPERATING WEEKDAY TWO-WAY TRAFFIC VOLUMES					
	MEDIUM AND HEAVY TRUCKS CARRYING[1]					
	SPECIAL WASTE	ADDITIVES & REAGENTS	SUB TOTAL	CLAY AND GRANULAR	TOTAL TRUCKS	EMPLOYEE VEHICLES[2]
A. Vineland Townline Road (RR#24)						
1. QEW to RR#81	106	18	124	0	124	0
2. RR#81 to Moyer	106	18	124	0	124	0
3. Moyer to RR#73	106	18	124	0	124	0
4. RR#73 to Ninth Ave.	106	18	124	152	276	0
5. Ninth Ave. to RR#216	106	18	124	152	276	0
6. RR#216 to Hwy 20	106	18	124	152	276	0
B. Highway 20						
1. RR#24 to Schram Rd.	158	18	176	152	328	266
2. Schram Rd. to Bismarck[3]	0	0	0	0	0	216
C. Schram Road						
1. Hwy 20 to site	158	18	176	152	328	482

NOTES:
1. The medium and heavy truck operating weekday volumes displayed are rounded values calculated by dividing the total annual volume by 250 working days during which these movements would occur (clay movements based on 210 working days/year).
2. Employee trips are based on normal workdays when maximum employment occurs and is concurrent with material movements.
3. Access road link B.2. is not a part of the defined local and regional access route; however volume assignment to this link is displayed in that this traffic surcharge is an input to the site noise impact assessment and design of the Highway 20/Schram Road intersection.

TABLE 12

OWMC CONSTRUCTION PERIOD TRAFFIC ON ACCESS ROADS
(07:00 TO 17:00 HOURS) - PEAK MONTH

Rd.Section	Year 1990 Without OWMC 07:00 to 17:00 Speed km/hr	Daily	% Trucks	Leq at 20 m from EOP	OWMC Peak Month Cars	Trucks	Year 1990 Total with OWMC 07:00 to 17:00 Total Daily	% Trucks	Leq at 20 m from EOP
A. Regional Rd.	24								
1. QEW to RR81	60	5958	19	67	178	2	6138	18.5	67
2. RR81 to Moyer	60	5496	22	67	178	2	5676	21.3	67
3. Moyer to RR73	70	5496	22	68	178	2	5676	21.3	68
4. RR73 to 9th	80	4278	22	68	178	956	5412	35.1	71
5. 9th to RR216	80	4026	22	68	178	956	5160	35.7	71
6. RR216 to Highway 20.	80	3354	22	67	178	956	4488	37.7	71
B. Highway 20									
1. RR24 to Schram	80	2100	16	64	488	970	3558	36.7	69
2. West of Schram	80	2100	16	64	400	6	2506	13.6	64

NOTES:

1. Year 1990 truck traffic and OWMC-generated truck traffic taken as 2:1 heavy to medium trucks.

2. Daily traffic counts are for 07:00 to 17:00 hours.

TABLE 13: LANDFILL OPERATIONS.

LEQ (dBA) NOISE LEVELS AT RESIDENTIAL LOCATIONS.

300,000 t/a - TYPICAL OPERATION.

LOC.	NAME	NORTH WEST FACE	NORTH WEST OLA	NORTH EAST FACE	NORTH EAST OLA	SOUTH EAST FACE	SOUTH EAST OLA	SOUTH WEST FACE	SOUTH WEST OLA
1	PELISSERO	44	43	39	38	37	36	41	40
2	FREURE	35	34	32	31	36	32	40	34
3	GARNER	45	44	40	39	38	34	42	38
4	CZENSE	46	45	41	40	39	38	43	42
5	PATRAS	47	46	42	41	39	34	43	38
6	MADSEN	48	47	43	42	40	35	43	38
7	SHANTRY	48	47	43	42	40	39	44	43
8	DEJONG	50	49	44	43	41	36	44	42
9	DEJONG	50	49	44	43	41	36	45	43
10	PARKER	53	52	47	46	43	37	46	44
11	KAPELLAS	53	52	47	46	43	42	46	45
12	SARANTAKOS	54	53	47	46	43	38	46	40
13	McCARTHY	55	54	48	47	44	38	47	41
14	BOUTILIER	56	55	48	47	44	38	47	41
15	McPHERSON	57	56	49	48	44	40	47	41
16	WILEY	58	57	50	49	44	38	47	41
17	REINER	57	56	49	48	45	44	48	47
18	HUIZINGA	67	62	53	48	46	45	48	38
19	DEVRIES	63	62	52	51	46	45	48	47
20	TSIANTOULAS	66	56	67	57	48	38	48	38
21	TSIANTOULAS	66	56	71	61	48	38	48	38
22	MEISEL	45	44	43	42	36	35	37	36
23	ROCKWELL	43	42	43	42	36	35	36	35
24	BRADLEY	43	42	44	43	37	36	36	35
25	HACKNEY	44	43	45	44	37	36	37	36
26	DIMAKIS	46	45	47	46	39	38	39	38
27	KSZAN	47	46	49	48	40	39	40	39
28	SZOKE	47	42	49	44	40	35	40	35
29	KSZAN	48	47	49	48	41	40	40	35
30	OTTEN	48	43	50	45	41	36	41	36
31	PINK	42	41	43	42	37	36	36	31
32	FARRER	56	46	62	52	48	38	46	36
33	BEAMER	55	54	62	61	48	47	46	45
34	STROOP	52	51	58	57	47	41	45	44
35	BEAMER	49	48	54	53	47	46	44	38
36	KOBYLKA	48	47	53	52	46	40	43	38
37	GRIEPSMA	47	46	52	51	45	39	43	37

LOC = LOCATION NO. FACE = EXPOSED FACE
OLA = OUTDOOR LIVING AREA

TABLE 13 (Cont'd): LANDFILL OPERATIONS.

LEQ (dBA) NOISE LEVELS AT RESIDENTIAL LOCATIONS.

300,000 t/a - TYPICAL OPERATION.

LOC.	NAME	NORTH WEST FACE	NORTH WEST OLA	NORTH EAST FACE	NORTH EAST OLA	SOUTH EAST FACE	SOUTH EAST OLA	SOUTH WEST FACE	SOUTH WEST OLA
38	BORADYN	48	47	52	51	46	45	44	43
39	VANDERVELDE	47	46	51	50	45	39	42	36
40	VANDERVELDE	46	45	50	49	45	39	42	36
41	VANDERVELDE	46	45	50	49	45	39	42	36
42	FODDEN	43	42	47	46	43	37	40	34
43	TRIFUNOVIC	41	40	44	43	41	40	39	38
44	MURPHY	39	38	42	41	39	35	37	33
45	COMFORT	42	41	38	37	41	40	45	44
46	COMFORT	43	42	39	38	42	41	46	44
47	BIELAK	43	42	40	39	42	41	47	42
48	KSZAN	48	47	46	45	52	51	63	62
49	MATHESON	47	46	48	47	67	66	59	58
50	DIEK	46	45	48	47	58	57	52	51
51	SNIPPE	47	43	49	43	58	55	52	51
52	DINIZ	45	44	48	47	52	51	47	46
53	HORTON	42	40	44	43	50	48	46	44
54	DAVISON	38	37	41	40	43	42	40	39
55	ROWE	38	37	40	39	44	43	41	40
56	GRACEY	40	39	41	40	49	48	45	44
57	SCHEUNDER	43	42	43	42	54	53	54	53
58	AUGUSTYN	40	39	40	39	49	46	49	46
59	NELSON	39	38	38	37	46	45	47	46
60	GRACEY	38	35	38	37	46	43	46	43
61	GRACEY	35	34	33	32	38	37	41	40
62	ELLIS	36	35	35	34	40	39	43	42
63	FOIS	37	36	35	34	41	40	43	42
64	HEASLIP	36	35	37	36	44	43	43	42
65	VITUCCI	36	35	37	36	43	42	42	41
66	BOVERHOF	35	34	36	35	42	41	40	39
67	BOVERHOF	34	33	35	34	41	40	39	38
68	LAMPMAN	33	32	34	33	40	39	37	36
69	BOVERHOF	32	31	34	33	39	38	37	36
70	HEASLIP	34	33	33	32	40	39	40	39
71	HEASLIP	34	33	34	33	41	40	41	40
72	CRITCHLEY	34	33	34	33	41	40	40	39

LOC = LOCATION NO. FACE = EXPOSED FACE
OLA = OUTDOOR LIVING AREA

TABLE 13 (Cont'd): LANDFILL OPERATIONS.

LEQ (dBA) NOISE LEVELS AT RESIDENTIAL LOCATIONS.

300,000 t/a - TYPICAL OPERATION.

LOC.	NAME	NORTH WEST FACE	NORTH WEST OLA	NORTH EAST FACE	NORTH EAST OLA	SOUTH EAST FACE	SOUTH EAST OLA	SOUTH WEST FACE	SOUTH WEST OLA
73	TRUDELL	33	32	34	33	40	39	38	37
74	OZOG	32	31	33	32	38	37	36	35
75	ZDICHAVSKY	57	56	64	63	45	44	42	41
76	PELISSERO	43	42	38	37	37	36	40	39
77	BARTEL	40	39	42	41	36	35	35	34
78	CROWN	38	37	40	39	35	34	33	32
79	BREUKELMAN	33	32	35	34	34	33	31	30
80	YAROMICH	35	34	38	37	36	35	34	33
81	BREUKELMAN	35	34	37	36	36	35	34	33
82	HORTON	35	34	37	36	39	38	36	35
83	HORTON	35	34	37	33	40	39	37	36
84	HITCHEN	30	29	32	31	36	35	34	33
85	HILL	33	32	33	32	39	38	40	39
86	HILL	33	32	32	31	39	38	39	38
87	SNIPPE	33	32	32	31	38	37	39	38
88	VANDERZANDAN	32	31	31	30	36	35	38	37
89	VANDERZANDAN	32	31	30	29	36	35	38	37
90	ALLEN	45	44	42	41	46	42	52	47
91	VERDONK	36	35	35	34	29	28	30	29
92	GRANT	39	38	38	36	32	31	32	31
93	PIERSMA	36	35	36	35	30	29	30	29
94	LOCKEY	36	35	36	35	30	29	30	29
95	KUIK	36	35	36	35	30	29	30	29
96	POTT	41	40	37	36	35	34	38	37

LOC = LOCATION NO. FACE = EXPOSED FACE
OLA = OUTDOOR LIVING AREA

TABLE 14: SUMMARY OF IMPACTED RESIDENCES
NOISE IMPACT REFERENCE MOE CRITERIA
300,000 t/a - TYPICAL OPERATION

LOC	NAME	AMB CRIT. FACE	INCREASE OVER AMB CRITERIA AT BLDG. FACE			
			NW	NE	SE	SW
18	HUIZINGA	56	11 H			
19	DEVRIES	55	8 M			
20	TSIANTOULAS	58	8 M	9 M		
21	TSIANTOULAS	58	8 M	13 H		
32	FARRER	58		4 L		
33	BEAMER	55		7 M		
48	KSZAN	55				8 M
49	MATHESON	55			12 H	4 L
75	ZDICHAVSKY	58		6 M		

IMPACT RATING

0-3	= NO IMPACT	
4-5	= LOW	(L)
6-10	= MODERATE	(M)
11 +	= HIGH	(H)

CRIT = CRITERIA
OLA = OUTDOOR LIVING AREA
ALL LEVELS = LEQ IN dAB

TABLE 14 (Cont'd): SUMMARY OF IMPACTED RESIDENCES
NOISE IMPACT REFERENCE MOE CRITERIA
300,000 t/a - TYPICAL OPERATION

LOC	NAME	AMB CRIT. FACE	INCREASE OVER AMB CRITERIA OUTDOOR LIVING AREA NW	NE	SE	SW
18	HUIZINGA	55	7 M			
19	DEVRIES	55	7 M			
20	TSIANTOULAS	55				
21	TSIANTOULAS	55		6 M		
32	FARRER	55				
33	BEAMER	55		6 M		
48	KSZAN	55				7 M
49	MATHESON	55			11 H	
75	ZDICHAVSKY	55		8 M		

IMPACT RATING

0-3	= NO IMPACT	
4-5	= LOW	(L)
6-10	= MODERATE	(M)
11 +	= HIGH	(H)

CRIT = CRITERIA
OLA = OUTDOOR LIVING AREA
ALL LEVELS = LEQ IN dAB

TABLE 15: SUMMARY OF IMPACTED RESIDENCES
NOISE IMPACT REFERENCE AMBIENT CRITERIA
300,000 t/a - TYPICAL OPERATION

LOC	NAME	AMB CRIT. FACE	INCREASE OVER AMB CRITERIA AT BLDG. FACE NW	NE	SE	SW
6	MADSEN	50				
8	DEJONG	55				
9	DEJONG	55				
10	PARKER	58				
11	KAPELLAS	58				
12	SARANTAKOS	56				
13	McCARTHY	58				
14	BOUTILIER	58				
15	McPHERSON	58				
16	WILEY	58				
17	REINER	56				
18	HUIZINGA	56	11 H			
19	DEVRIES	55	8 M			
20	TSIANTOULAS	58	8 M	9 M		
21	TSIANTOULAS	58	8 M	13 H		
22	MEISEL	46				
26	DIMAKIS	47				
27	KSZAN	48				
28	SZOKE	47				
29	KSZAN	46		4 L		
30	OTTEN	47				
32	FARRER	58		4 L		
33	BEAMER	55		7 M		
34	STROOP	58				

IMPACT RATING

0-3	= NO IMPACT	
4-5	= LOW	(L)
6-10	= MODERATE	(M)
11 +	= HIGH	(H)

CRIT = CRITERIA
OLA = OUTDOOR LIVING AREA
ALL LEVELS = LEQ IN dBA

TABLE 15 (Cont'd): SUMMARY OF IMPACTED RESIDENCES
NOISE IMPACT REFERENCE AMBIENT CRITERIA
300,000 t/a - TYPICAL OPERATION

LOC	NAME	AMB CRIT. FACE	INCREASE OVER AMB CRITERIA AT BLDG. FACE NW	NE	SE	SW
35	BEAMER	56				
36	KOBYKA	58				
39	VANDERVELDE	56				
48	KSZAN	43	5 L		9 M	20 H
49	MATHESON	49			18 H	10 M
50	DIEK	40	6 M	8 M	18 H	12 H
51	SNIPPE	47			11 H	5 L
52	DINIZ	40	5 L	8 M	12 H	7 M
53	HORTON	44			6 M	
5[illegible]	GRACEY	47				
57	SCHEUNDER	41			13 H	
58	AUGUSTYN	47				
59	NELSON	44				
60	GRACEY	47				
75	ZDICHAVSKY	58		6 M		
90	ALLEN	43				9 M

IMPACT RATING

0-3	= NO IMPACT	
4-5	= LOW	(L)
6-10	= MODERATE	(M)
11 +	= HIGH	(H)

CRIT = CRITERIA
OLA = OUTDOOR LIVING AREA
ALL LEVELS = LEQ IN dBA

TABLE 15 (Cont'd): SUMMARY OF IMPACTED RESIDENCES
NOISE IMPACT REFERENCE AMBIENT CRITERIA
300,000 t/a - TYPICAL OPERATION

LOC	NAME	AMB CRIT. FACE	INCREASE OVER AMB CRITERIA OUTDOOR LIVING AREA NW	NE	SE	SW
6	MADSEN	40	7 M			
8	DEJONG	45	4 L			
9	DEJONG	45	4 L			
10	PARKER	48	4 L			
11	KAPELLAS	48	4 L			
12	SARANTAKOS	46	7 M			
13	McCARTHY	48	6 M			
14	BOUTILIER	48	7 M			
15	McPHERSON	48	8 M			
16	WILEY	48	9 M			
17	REINER	46	10 M			
18	HUIZINGA	46	16 H			
19	DEVRIES	45	17 H	6 M		
20	TSIANTOULAS	48	8 M	9 M		
21	TSIANTOULAS	48	8 M	13 H		
22	MEISEL	40	4 L			
26	DIMAKIS	40	5 L	6 M		
27	KSZAN	40	6 M	8 M		
28	SZOKE	40		4 L		
29	KSZAN	40	7 M	8 M		
30	OTTEN	40		5 L		
32	FARRER	48		4 L		
33	BEAMER	45	9 M	16 H		
34	STROOP	48		9 M		

IMPACT RATING

0-3	= NO IMPACT	
4-5	= LOW	(L)
6-10	= MODERATE	(M)
11 +	= HIGH	(H)

CRIT = CRITERIA
OLA = OUTDOOR LIVING AREA
ALL LEVELS = LEQ IN dBA

TABLE 15 (Cont'd): SUMMARY OF IMPACTED RESIDENCES
NOISE IMPACT REFERENCE AMBIENT CRITERIA
300,000 t/a - TYPICAL OPERATION

LOC	NAME	AMB CRIT. FACE	INCREASE OVER AMB CRITERIA OUTDOOR LIVING AREA NW	NE	SE	SW
35	BEAMER	46		8 M		
36	KOBYLKA	48		4 L		
39	VANDERVELDE	46		4 L		
48	KSZAN	40	7 M	5 L	11 H	22 H
49	MATHESON	40	6 M	7 M	26 H	18 H
50	DIEK	40	5 M	7 M	17 H	11 H
51	SNIPPE	40			15 H	11 L
52	DINIZ	40	4 L	7 M	11 H	6 M
53	HORTON	40			8 M	4 L
56	GRACEY	40			8 M	4 L
57	SCHEUNDER	40			13 H	13 H
58	AUGUSTYN	40			6 M	6 M
59	NELSON	40			5 L	6 M
60	GRACEY	40			5 L	
75	ZDICHAVSKY	48	8 M	15 H		
90	ALLEN	40	4 L			7 M

IMPACT RATING

0-3	= NO IMPACT	
4-5	= LOW	(L)
6-10	= MODERATE	(M)
11 +	= HIGH	(H)

CRIT = CRITERIA
OLA = OUTDOOR LIVING AREA
ALL LEVELS = LEQ IN dBA

TABLE 16:

300,000 t/a - TYPICAL OPERATION
MITIGATION MEASURES TO BE CONSIDERED
REFERENCE MOE CRITERIA

LOC	NAME	RESIDENCE CENTRAL A/C	RESIDENCE UPGRADE WINDOWS	RESIDENCE WARNING	OLA BARRIER	OLA WARNING	EST. COST $
18	HUIZINGA	Y	Y		Y		18,500
19	DEVRIES	Y	Y		Y		18,500
20	TSIANTOULAS	Y	Y				14,500
21	TSIANTOULAS	Y	Y		Y		18,500
32	FARRER			Y			-
33	BLAMER	Y	Y		Y		18,500
48	KSZAN	Y	Y		Y		18,500
49	MATHESON	Y	Y		Y		18,500
75	ZDICHAVSKY	Y	Y		Y		18,500

TABLE 17:

300,000 - TYPICAL OPERATION
MITIGATION MEASURES TO BE CONSIDERED.
REFERENCE AMBIENT CRITERIA.

LOC	NAME	RESIDENCE CENTRAL A/C	RESIDENCE UPGRADE WINDOWS	RESIDENCE WARNING	OLA BARRIER	OLA WARNING	EST. COST $
6	MADSEN				Y		4,000
8	DEJONG					Y	-
9	DEJONG					Y	-
10	PARKER					Y	-
11	KAPELLAS					Y	-
12	SARANTAKOS				Y		4,000
13	McCARTHY				Y		4,000
14	BOUTILIER				Y		4,000
15	McPHERSON				Y		4,000
16	WILEY				Y		4,000
17	REINER				Y		4,000
18	HUIZINGA	Y	Y		Y		18,500
19	DEVRIES	Y	Y		Y		18,500
20	TSIANTOULAS	Y	Y		Y		18,500
21	TSIANTOULAS	Y	Y		Y		18,500
22	MEISEL					Y	-
26	DIMAKIS				Y		4,000
27	KSZAN				Y		4,000
28	SZOKE					Y	-
29	KSZAN			Y	Y		4,000
30	OTTEN					Y	-
32	FARRER					Y	-
33	BEAMER	Y	Y		Y		18,500
34	STROOP				Y		4,000
35	BEAMER				Y		4,000
36	KOBYLKA					Y	-
39	VANDERVELDE					Y	-
48	KSZAN	Y	Y		Y		18,500
49	MATHESON	Y	Y		Y		18,500
50	DIEK	Y	Y		Y		18,500
51	SNIPPE	Y	Y		Y		18,500
52	DINIZ	Y	Y		Y		18,500
53	HORTON	Y	Y		Y		18,500
56	GRACEY				Y		4,000
57	SCHEUNDER	Y	Y		Y		18,500
58	AUGUSTYN				Y		4,000
59	NELSON				Y		4,000
60	GRACEY					Y	-
75	ZDICHAVSKY	Y	Y		Y		18,500
90	ALLEN	Y	Y		Y		18,500

TABLE 18: LANDFILL OPERATIONS
LEQ (dBA) NOISE LEVELS AT BARN LOCATIONS
300,000 t/a - TYPICAL OPERATION

NAME	LOC	EXISTING AMBIENT (dBA)	NOISE LEVELS (dBA)			
(Barns)			NW	NE	SE	SW
MADSEN	A	50	48	43	40	43
SHANTRY	B	54	48	43	40	44
DE JONG FARMS	C	50	50	44	41	44
DE JONG FARMS	D	46	49	44	41	44
DE JONG FARMS	E	41	48	43	40	43
SARANTAKOS	F	48	53	47	44	47
McCARTHY	G	52	55	48	44	47
REINER	H	55	57	49	45	48
REINER	I	52	57	49	45	48
HUIZINGA	J	59	67	53	46	48
CHOW	K	52	67	60	47	48
TSIANTOULAS	L	50	65	66	47	48
TSIANTOULAS	M	49	65	66	47	47
DIMAKIS	N	46	46	47	39	39
BEAMER	O	52	49	54	47	44
VANDERVELDE	P	53	46	50	45	42
BORADYN	Q	49	48	52	47	44
TRIFUNOVIC	R	50	41	44	41	39
BIELAK EST.	S	40	43	40	39	50
BIELAK EST.	T	40	43	40	39	50
KSZAN	U	40	48	46	52	63
DIEK	V	40	46	48	58	52
DINIZ	W	40	45	48	52	47
SNIPPE	X	47	47	49	58	52
GRACEY	Y	46	40	41	49	45
ROWE	Z	40	38	40	44	41

TABLE 18 (Cont'd): LAND FILL OPERATIONS
LEQ (dBA) NOISE LEVELS AT BARN LOCATIONS
300,000 t/a - TYPICAL OPERATION

NAME	LOC	EXISTING AMBIENT (dBA)	NOISE LEVELS (dBA)			
(Barns)			NW	NE	SE	SW
GRACEY	A1	40	35	33	38	41
ELLIS	B1	46	36	35	40	43
FOIS	C1	50	37	35	41	43
FOIS	D1	40	37	35	41	43
AUGUSTYN	E1	40	40	40	49	49
SCHEUNDER	F1	40	43	43	54	54
GRACEY	G1	45	39	38	46	47
BOVERHOF	H1	40	35	36	42	40
CZENSE	J1	52	46	41	39	43
COMFORT	K1	44	42	38	41	45
FARRER	L1	50	56	62	48	46
NELSON	M1	41	39	38	46	47
HEASLIP	N1	42	36	37	44	43
BOVERHOF	P1	44	32	34	39	37
OZOG	Q1	52	32	33	38	36
HEASLIP	R1	53	33	34	41	41
HEASLIP	S1	53	33	34	41	41
HEASLIP	T1	52	33	33	39	40
SNIPPE	U1	46	33	32	38	39
VANDERZANDEN	V1	40	33	32	38	39
VANDERZANDEN	W1	40	33	32	38	39
FOIS	X1	40	37	35	41	43
PELISSERO	Y1	50	44	39	37	41
PELISSERO	Z1	50	44	39	37	41

TABLE 19

ACCESS ROAD TRAFFIC NOISE LEVELS
(07:00 TO 17:00 HOURS)
150,000 t/a - TYPICAL OPERATION MODE

Rd. Section	Speed km/hr	Year 1995 Without OWMC 07:00 to 17:00 Daily	% Trucks	Leq at 20 m from EOP	OWMC Cars	OWMC Trucks	Year 1995 Total with OWMC 07:00 to 17:00 Total Daily	% Trucks	Leq at 20 m from EOP
A. Regional Rd. 24									
1. QEW to RR81	60	7284	19	68	0	64	7348	18.9	68
2. RR81 to Moyer	60	7050	22	68	0	64	7114	22.7	68
3. Moyer to RR73	70	7050	22	69	0	64	7114	22.7	69
4. RR73 to 9th	80	5226	22	69	0	142	5368	24.1	69
5. 9th to RR216	80	4644	22	68	0	142	4786	24.3	69
6. RR216 to Highway 20.	80	3870	22	68	0	142	4012	24.8	68
B. Highway 20									
1. RR24 to Schram.	80	2166	16	64	180	168	2514	20.5	65
C. Schram Rd.									
Hwy 20 to Site	80	90	3	46	328	168	586	29.2	60

NOTES:

1. Year 1995 truck traffic and OWMC-generated truck traffic taken as 2:1 heavy traffic to medium trucks.
2. Daily traffic counts are for 07:00 to 17:00 hours.

TABLE 20

ACCESS ROAD TRAFFIC NOISE LEVELS
(07:00 TO 17:00 HOURS)
300,000 t/a - TYPICAL OPERATION MODE

Rd. Section	Year 2000 Without OWMC 07:00 to 17:00 Speed km/hr	Daily	% Trucks	Leq at 20 m from EOP	Year 2000 Total with OWMC 07:00 to 17:00 OWMC Cars	OWMC Trucks	Total Daily	% Trucks	Leq at 20 m from EOP
A. Regional Rd. 24									
1. QEW to RR81	60	8898	19	69	0	124	9022	20.1	69
2. RR81 to Moyer	60	9042	22	69	0	124	9166	23.1	69
3. Moyer to RR73	70	9042	22	71	0	124	9166	23.1	71
4. RR73 to 9th	80	6390	22	70	0	276	6666	25.2	71
5. 9th to RR216	80	5352	22	69	0	276	5628	25.8	70
6. RR216 to Highway 20.	80	4470	22	68	0	276	4746	26.5	69
B. Highway 20									
1. RR24 to Schram.	80	2232	16	64	263	328	2823	24.3	66
C. Schram Rd.									
Hwy 20 to Site	80	96	3	46	434	328	858	38.6	63

NOTES:

1. Year 2000 truck traffic and OWMC-generated truck traffic taken as 2:1 heavy trucks to medium trucks.

2. Daily traffic counts are for 07:00 to 17:00 hours.

TABLE 21

SAMPLE TRAFFIC NOISE COMPUTER READOUT

INPUT PARAMETERS

File number: W85-248
Project name: OWMC PHASE 4B- 300,00 t/a TYP.

Source name: REGIONAL ROAD 24
RR216 to HWY 20 WITHOUT OWMC

Period of time (hrs): 10
Vehicles in time period: 4470

Growth percentage: 0
Number of growth years: 0
Projected number of vehicles: 4470

Percent cars: 78
Percent medium trucks: 7
Percent heavy trucks: 15

Car speed (kph): 80
Medium truck speed (kph): 80
Heavy truck speed (kph): 80

Effective source height: 1.9
Road gradient: 0

Location	Distances (meters)				Angles (degrees)		Alpha	Factors (meters)		Reflec-tion	Receiver height (meters)
	Near	Far	Bqv	Inter-section	Neg	Pos		P	I		
TYPICAL DISTANCE - 20 m FROM EOP	23.5	23.5	23.5	0.0	-90.0	90.0	0.50	0.6	0.6	0	1.5

CALCULATED SOUND LEVELS

Location	Leq(16) (dBA)	Leq(8) (dBA)	Leq(10) (dBA)
TYPICAL DISTANCE - 20 m FROM EOP	---	---	68

MAPS
NOT
FILMED

CARTES
OMISES